United States Environmental Protection Agency
Office of Emergency and Remedial Response
EPA/ROD/R09-92/085
September 1992

EPA

Superfund Record of Decision:

Jasco Chemical, CA

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R09-92/085	2.	3. Recipient's Accession No.
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16. Abstract (Limit: 200 words)

The 2.05-acre Jasco Chemical site is a chemical blending and packaging facility in Mountain View, Santa Clara County, California. Land use in the area is predominantly residential with some light industry. An estimated 67,000 residents in the City of Mountain View use municipal water from wells and a reservoir as their drinking water supply; however, EPA has determined that ground water in the shallow aquifer underlying the site is a potential source of drinking water. From 1951 to 1976, the site changed hands several times. In December 1976, Jasco began repackaging bulk chemicals into smaller quantities and blending chemicals to produce products, such as paint thinners and degreasers. Jasco received bulk chemicals in 55-pound bags and in 55-gallon drums, and chemicals were stored in eight underground tar-wrapped storage tanks. In 1984, putty mixing operations were initiated. As a result of a citizen's complaint of solvents being dumped onsite, the state conducted a preliminary ground water investigation in 1984, which showed the presence of pentachlorophenol and methylene chloride, chemicals used by Jasco, in the soil and ground water. In 1985, a subsequent investigation showed the presence of high levels of contaminated soil in the drainage

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Jasco Chemical, CA
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 80
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

swales around the plant. In 1987, Jasco removed a leaking underground diesel storage tank that had been installed prior to 1976. Soil sampling in the immediate area showed the presence of diesel derivatives, such as PAHs. Since 1987, Jasco has been extracting and discharging contaminated ground water to the storm sewer system in accordance with their permit provisions. In 1990, trace chemicals placed in the eight underground tanks revealed one leak below action levels. This ROD addresses treating tank source materials present in the soil and ground water and preventing future migration of contaminants. The primary contaminants of concern affecting the soil and ground water are VOCs, including benzene, PCE, TCE, toluene, and xylenes.

The selected remedial action for this site includes excavating and treating 1,100 cubic yards of contaminated soil onsite using enhanced biotreatment; treating air emissions using carbon adsorption, and treating or disposing of spent carbon offsite; testing residual soil, with pretreatment if necessary, and onsite disposal if treatment levels are met, or offsite disposal if clean up levels are still exceeded; extracting and treating contaminated ground water with an onsite liquid phase carbon adsorption unit, and discharging treated ground water offsite to a sanitary sewer, as permitted; implementing hydraulic controls to prohibit future plume migration, conducting quarterly ground water monitoring; and implementing institutional controls including deed restrictions to limit use of ground water. The estimated present worth cost for this remedial action ranges from $601,000 to $684,000, which includes a $32,800 annual O&M cost for 5-10 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific soil clean-up goals are established on health-based levels estimated using SDWA MCLs and include 1,1-DCA 0.6 mg/kg; 1,1-DCE 2 mg/kg; 1,2-DCE 0.03 mg/kg; cis-1,2-DCE 1 mg/kg; 1,1,1-TCA 100 mg/kg; acetone 30 mg/kg; benzene 0.3 mg/kg; chloroethane 4,000 mg/kg; diesel mixture 10,000 mg/kg; ethylbenzene 3,000 mg/kg; methanol 200 mg/kg; methyl ethyl ketone 9 mg/kg; methylene chloride 0.2 mg/kg; PCE 7 mg/kg; toluene 1,000 mg/kg; TCE 3 mg/kg; vinyl chloride 0.02 mg/kg; and xylenes 2,000 mg/kg. Chemical-specific ground water clean-up goals are based on federal and state MCLs and include acetone 4,000 ug/l; benzene 1 ug/l; 1,1-DCA 5 ug/l; 1,1-DCE 6 ug/l; 1,2-DCA 0.5 ug/l; methylene chloride 5 ug/l; PCE 5 ug/l; toluene 1 ug/l; petroleum hydrocarbons 1 ug/l; and vinyl chloride 0.5 ug/l.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 95105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

RECORD OF DECISION

PART I: DECLARATION

PART II: DECISION SUMMARY

PART III: RESPONSIVENESS SUMMARY

JASCO CHEMICAL COMPANY SUPERFUND SITE

Mountain View, California

SEPTEMBER 30, 1992

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

DECLARATION

PART I: DECLARATION

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 95105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

DECLARATION

1.0 SITE NAME AND LOCATION

JASCO CHEMICAL COMPANY
SANTA CLARA COUNTY
Mountain View, California

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision ("ROD") presents the selected remedial actions for the Jasco Chemical Company Superfund site in Mountain View, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et. seq., and to the extent practicable the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Section 300 et. seq., ("NCP"). EPA issues this Record of Decision ("ROD") pursuant to section 104 of CERCLA, and has selected the remedial action in accordance with section 121 of CERCLA. As provided in section 121 (e)(1) of CERCLA, no federal, state or local permit shall be required for the portion of any remedial action conducted entirely onsite, when such remedial action is carried out in compliance with section 121. This decision is based on the administrative record for this site.

The State of California concurs with the selected remedy.

3.0 ASSESSMENT OF THE SITE

Actual or threatened release of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

4.0 DESCRIPTION OF THE REMEDY

The remedy addresses the principal threat remaining at the Jasco Chemical Company Superfund site by treating the toxic source materials that are present in groundwater and soil thereby significantly reducing the mobility and/or volume of hazardous substances in the media and preventing the continued migration of contaminants into the groundwater. This response action will greatly reduce the possibility of contamination of existing drinking water supplies and potential future water supplies.

This action represents the final remedial action to remove contaminants from soil and groundwater. The major components of the selected remedy include the following:

a. On-site construction of a liquid phase carbon adsorption groundwater treatment unit. Groundwater will be extracted and passed through a liquid phase carbon adsorption bed. The contaminants would adhere to the activated carbon, which would then be removed from the site and disposed of at a licensed facility. The treated groundwater will continue to be discharged to the sanitary sewer system under existing Permit Nos. 491010 and 491520, or alternate method of discharging water that complies with applicable law.

b. Continued groundwater extraction (pump and treat) until cleanup standards are achieved in all present and future wells at the Jasco facility. Table 4.1 depicts all groundwater cleanup standards that shall be achieved.

c. Maintenance of hydraulic control (pumping of water to control the flow of the plume) to prohibit the further vertical and horizontal migration of the groundwater plume. This requirement shall remain in effect until cleanup standards are achieved.

d. Continued quarterly groundwater monitoring at all monitoring and extraction wells on the Jasco site during the cleanup period. Groundwater samples shall continue to be collected to verify that cleanup is proceeding and that there is no migration of contaminants above cleanup standard levels, beyond current boundaries or into the deeper B zone. The frequency of monitoring shall be decreased from quarterly to triannually two years after all site soils have been remediated as shown by soil confirmation sampling. The frequency of monitoring shall be decreased to biannually once groundwater cleanup standards have been achieved in all site wells and stabilized for one year.

Sampling and reporting requirements for the Jasco site are contained in the Sampling and Analysis Plan for the site which is part of the Administrative Record for the site.

e. Installation of additional extraction (pumping) wells, in a quantity and at locations to be determined by EPA, to improve the performance of the groundwater extraction and treatment system.

f. Treatment of all site soils containing chemical concentrations greater than the cleanup standards shown on Table 4.1 with the enhanced biotreatment method. Under this method contaminated soil shall be excavated and placed in an enclosed container. The soil shall be mixed with nutrients to encourage digestion of contaminants by microorganisms. The container shall have an air distribution system along the bottom. Air drawn through this system will provide oxygen to the microorganisms and also extract the volatile organic compounds. The air stream shall then pass through an activiated carbon adsorption system. The carbon will be taken off-site and disposed of at a facility with a permit to accept hazardous waste.

g. Sampling of site soils beneath the production facility, the drum storage area, and the underground storage tank area to ensure that the concentration of contaminants in these areas do not exceed soil cleanup standards. This sampling shall commence within six months after completion of treatment of soils located in the drainage swale area. If contamination exceeds the cleanup standards, the soil shall be treated as set forth in subparagraph (f) above, and if necessary, subparagraph (h) below.

h. Off-site disposal of site soils containing residual concentrations greater than the soil cleanup standards after biological treatment has been completed.

i. Restrictive easement (deed restriction). Jasco shall be required to file a restrictive easement in the Official Records of the County of Santa Clara, which prohibits use of on-site shallow groundwater for drinking water purposes and controlling other subsurface activities. The restrictive easement shall remain in place until soil and groundwater cleanup standards are achieved.

5.0 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes innovative technology, alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

The remedy will take approximately 10 years to complete for groundwater and 2-5 years to complete for <u>all</u> site soils. A five-year review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Wise

John Wise
Deputy Regional Administrator

9.30.92

Date

DECISION SUMMARY

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
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PART II. DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the Jasco Chemical Company site ("the Study Area"), the remedial alternatives, and the analysis of the remedial alternatives. This Decision Summary explains the rationale for the remedy selection and how the selected remedy satisfies the statutory requirements of CERCLA.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 SITE NAME AND LOCATION

Jasco Chemical Company
1710 Villa Street
Santa Clara County
Mountain View, CA

The Jasco Chemical Company site consists of the property located at 1710 Villa Street in the City of Mountain View. The site consists of 2.05 acres currently owned by Harry M. Anthony. **Figures 1.1 - 1.4** shows the site location, site boundaries, and property boundaries.

The City of Mountain View lies in a relatively flat portion of the Santa Clara Valley approximately 40 miles south of San Francisco (see **Figure 1.1**). There are approximately 67,000 people within the city of Mountain View (5 1/2 miles x 3 1/2 miles^2), with the closest residence located about 50 feet west of the site. There are 4 elementary schools and 3 playgrounds within the 3 miles surrounding the site. The closest school is located within one mile of the site. This is a residential setting, dominated by single family homes to the south, and the Villa Mariposa apartment complex to the east. Single and multi-family dwellings located along Higdon Avenue border the Jasco site to the west. Villa Street is located south of the site and the Southern Pacific Railroad main line right-of-way borders the site to the north.

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The Jasco site is at an approximate elevation of 60 feet above mean sea level. The surrounding topography slopes gently toward the north-northeast. Surface water on the developed portion of the site drains generally toward the north-northeast. The only surface water near the site is Permanente Creek, which is about 600 feet northwest of the site. Permanente Creek is a perennial stream that flows north-northeast a distance of 3.5 miles before reaching the Mountain View Slough which drains into the San Francisco Bay. The creek itself is channelized, concrete-lined, and is primarily used for drainage and flood control.

In the past, surface water from the Jasco site collected in the drainage swale area located in the rear of the facility. In addition, surface water was discharged to three on-site dry wells. The on-site dry wells were destroyed in April 1988. Surface water runoff is currently being collected in a 4,000 gallon tank before being discharged to the City of Mountain View sanitary sewer system.

1.2 REGIONAL TOPOGRAPHY

The Study Area is located in the Santa Clara Valley which extends southeast from San Francisco Bay and is bounded by the Diablo Range to the north and east, and by the Santa Cruz Mountains on the west (see **Figure 1.5**).

The Santa Clara Valley is a large structural depression in the Central Coastal Ranges of California. The Valley is filled with alluvial and fluvial deposits from the adjacent mountain ranges. These deposits are up to 1,500 feet in thickness. At the base of the adjacent mountains, gently sloping alluvial fans of the basin tributaries laterally merge to form an alluvial apron extending into the interior of the basin.

1.3 CLIMATOLOGY

The San Francisco Bay Area has pronounced wet and dry seasons with mild wet winters and warm dry summers characteristic of a Mediterranean climate. The area lies in the path of winter storms which periodically sweep inland from the North Pacific. Freezing temperatures and snow are extremely rare. Rainfall from the winter storms range from moderate to heavy. Precipitation data is available from the many weather stations in the area. Records show the average annual rainfall to be about 14 inches. The site averages approximately 10 to 14 inches of rainfall per year. Over 75% of the total annual rainfall in this area occurs during the winter months of November through March. The average annual wind speed is approximately 6 to 7 mph (about 3 m/sec) with slightly stronger winds occurring in the summer. Winds in the area are predominantly from the west northwest.

1.4 ADJACENT AND HISTORICAL LAND USE

Historically, the 2.05 acre Jasco site has been zoned for industrial purposes. The Villa-Mariposa Area Precise Plan establishes land use within this portion of the city (see Figure 1.6). The Jasco site is part of the Villa-Mariposa Area which includes a moderate-density residential neighborhood. This 23-acre area is bounded by the Southern Pacific Railroad, Shoreline Boulevard, Villa Street and the rear lot lines of residential properties fronting Higdon Avenue. Prior to 1970, the property was zoned MM (General Industrial) District. Eighty-five percent of the property was previously occupied by the Pacific Press Publishing Association, an industrial printing/publishing house for the Seventh Day Adventist Church. In 1983, the Press announced that it was going to close its Mountain View facility and sell its property. With the anticipated move of the Pacific Press operation, the city reconsidered basic land use provisions within this area. The Villa-Mariposa Area Precise plan provides for transition of this older industrial complex into a residential area. The Plan provided for the amortization of existing industrial uses and buildings. The property is currently zoned P (Planned Community). The plan sets other industrial/office uses as nonconforming if they do not follow the Master Development Plan. The Jasco facility was designated as "high-hazard occupany", and as such its use at 1710 Villa Street was to be terminated by December 1993. All of the Precise Plan properties have been redeveloped, except for the Jasco property. In an Environmental Planning Commission meeting on July 15, 1992, Jasco applied for a two-year extension to their amortization. The commission approved the extension, which allows the facility to remain operating on the current site until December 1995.

1.5 HYDROGEOLOGY

Regional Hydrogeology

The Santa Clara Valley groundwater basin is divided into two broad areas: 1) the forebay, and 2) the confined area. The forebay occurs along the elevated edges of the basin where the basin receives its principal recharge. The confined area is located in the flatter interior portion of the basin and is stratified or divided into individual beds separated by significant aquitards. The confined area is divided into the upper and lower aquifer zones. The division is formed by an extensive regional aquitard that occurs at depths ranging from about 100 feet near the confined area's southern boundary to about 150 to 250 feet in the center of the confined area and beneath San Francisco Bay. Thickness of this regional aquitard varies from about 20 feet to over 100 feet.

Several aquifer systems occur in the upper aquifer zone separated by aquitards which may be leaky or very tight. Groundwater contamination at the site occurs within the upper aquifer zone. The lower aquifer zone occurs beneath the practically impermeable regional aquitard. Numerous individual aquifers occur within this predominantly aquitard zone and all groundwater in this zone is confined.

Site Hydrogeology

Three higher permeability aquifer units have been identified within the upper 70 foot section at the Jasco facility. The units have been designated as the A-, B_1-, and B_2- aquifers. The A-aquifer within the study area is encountered at depths ranging from 22.0 to 35.5 feet below ground surface (bgs or 28 feet above mean sea level). The thickness of the shallow A-aquifer ranges from 0.5 to 13.5 feet. In well V-7, located 8 feet west of I-2 on the median of the Central Expressway, the A-aquifer is represented by 13.5 feet of alternating layers of sand, gravel, and clay. Well I-2 is represented by 14.7 feet of gravelly sand and silty sand. A comparison of boring logs shows that the thickness of the A-aquifer decreases towards the west on the median of the Central Expressway. The bottom of the A-aquifer extends to depths of 28.0 to 42.7 below ground surface.

The A-B_1 aquitard is composed of clay to sandy clay with vertical permeabilities that range from 3.1×10^{-7} cm/sec to 2.8×10^{-6} cm/sec. The thickness of this aquitard ranges from 6.5 feet at I-1 to 17 feet at I-2, and 14 feet at I-3. The vertical permeabilities at I-3 and I-2 are similiar (1.2×10^{-4}).

The B_1-aquifer is encountered at depths ranging from 42.0 to 47.5 feet bgs with the bottom of the aquifer at depths ranging from 54.5 to 57.5 feet. The thickness of the B_1 aquifer ranges from 11.2 feet at I-1 (gravelly sand), to 7.5 feet of silty, gravelly, sand at I-2, to 9.0 feet of gravelly sand at I-3.

The B_1-aquifer is separated from the underlying B_2-aquifer by a low permeability unit designated as the B_1-B_2 aquitard. The B_1-B_2 aquitard was found at 59.5 feet below ground surface. The aquifer material here consists of sandy clay with a vertical permeability that ranges from 2.9×10^{-7} cm/sec at I-3 and 2.8×10^{-8} cm/sec at I-2. The B_2 aquifer was penetrated only at I-3 and the top of this aquifer was penetrated at 57.5 feet bgs and terminated at 71.0 feet without reaching the bottom of the B_2-aquifer.

Drilling logs indicate that the C-aquifer is approximately 150 feet below ground surface and is separated from the B-aquifer by the B-C aquitard. The B-C aquitard consists of two clay layers, 7.9 and 12.1 feet in thickness. The confining layers are separated by a 20-foot thick cemented gravel layer.

The deep aquifer is of drinking water quality in areas of Mountain View and beneath the site. The direction of groundwater flow in the shallow aquifer is generally toward the northeast with an average gradient of 0.004 ft/ft.

1.6 WATER USE

The following groundwater wells are located within a three mile radius of the site:

Mountain View Municipal Well numbers 8, 9, 10, and 17
City of Sunnyvale Losse Well
City of Palo Alto Emergency Wells: Fernando, Matadero, and Meadows

The City of Palo Alto supplies all of its drinking water needs by using the Hetch Hetchy Reservoir. The Hetch Hetchy Aqueduct carries surface water from the Sierra Nevada Mountains about 120 miles to the east. There is no apparent route through which existing domestic water supply wells could be impacted by site contaminants because the groundwater flows to the north and Well #17 is west and Well #18 is east of the site.

The total population served by groundwater within this 3 mile radius is as follows: Mountain View 67,000 people; Sunnyvale 212,000 people; Palo Alto Emergency Wells 56,000 people. In 1987 Mountain View identified Well MV-10 as an active well producing 800 gallons/minute from between 450 to 800 feet bgs. Well water supplied 10% of the drinking water for the City of Mountain View with Hetch-Hetchy suppling 90% of the drinking water supply.

The Jasco site appears to be within the zone of influence of Well #17 which connects directly into City transmission mains. Mountain View well #17 is located within 2,000 feet northwest of the Jasco site and is screened from the 236 to 560 feet bgs in the C aquifer producing 1/2 million gallons/day. The drilling logs for Well #17 showed an aquitard that is significantly thinner than those seen in other areas of the city. Mountain View Well #17 was shut off on December 14, 1986. This action occurred so that city officials could determine whether or not contamination from the Jasco site was impacting this well. The well resumed pumping in 1988 after it was determined that the site was not impacting Well #17.

There are a number of beneficial uses of the surface water and groundwater. Local surface waters include Permanente Creek and San Francisco Bay. The groundwater is a potential drinking water source. The existing and potential beneficial uses of the surface waters (South San Francisco Bay and Permanente Creek) include:

a. contact and non-contact water recreation
b. cold fresh water habitat
c. fish spawning
d. fish migration
e. rare and endangered species habitat
f. wildlife habitat
g. estuarine habitat
h. navigation
i. shellfish harvesting

j. industrial service supply
k. ocean commercial and sport fishing

Existing and potential beneficial uses of currently uncontaminated groundwater in the vicinity of the site within the shallow and deep aquifers could be adversely affected if the spread of contamination is uncontrolled.

The existing and potential beneficial uses of the groundwater underlying the site include industrial process water supply, industrial service water supply, municipal and domestic water supply, and agricultural water supply.

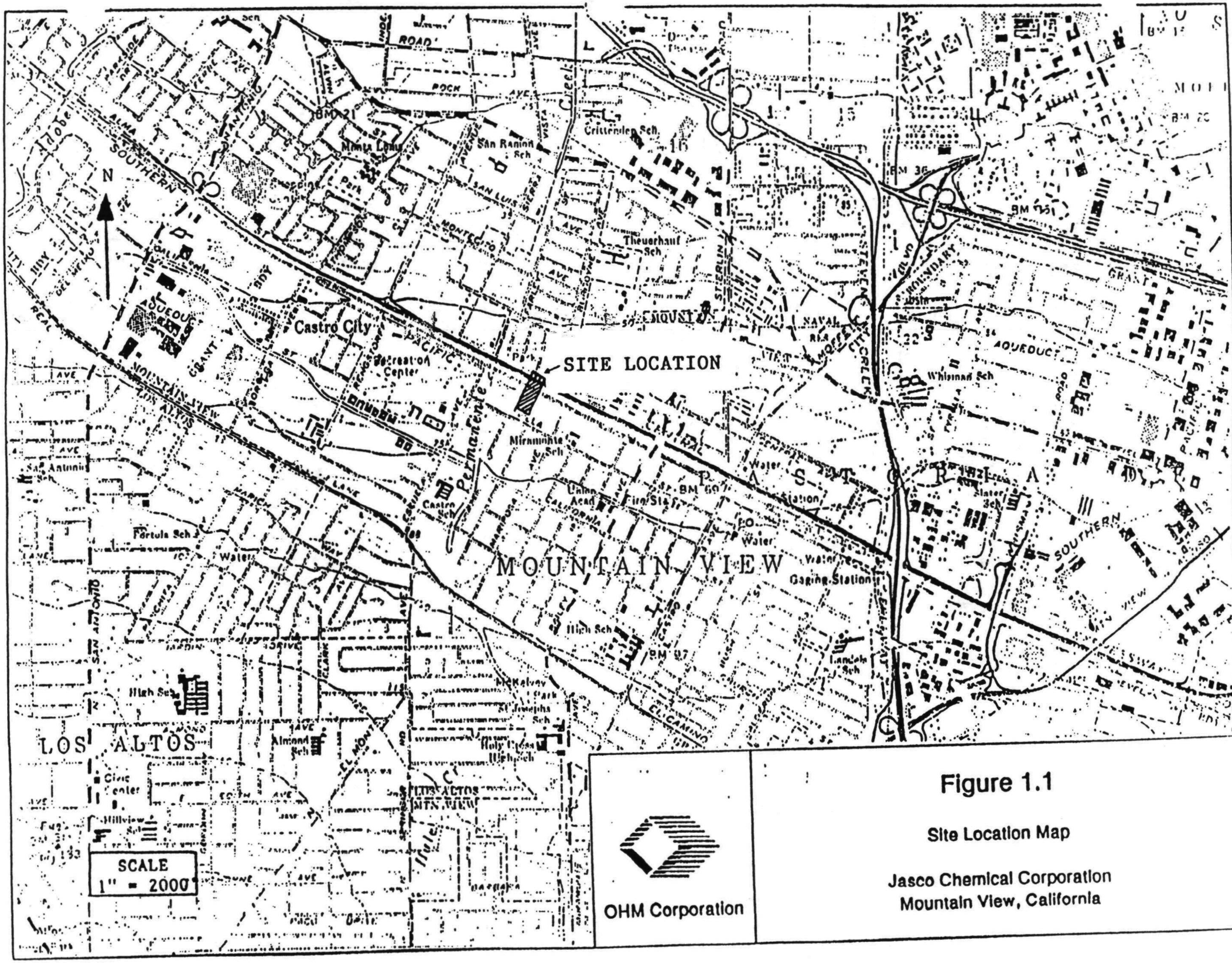
1.7 SURFACE AND SUBSURFACE FEATURES

The site is enclosed on three sides by an 8-foot high cyclone fence. The fourth side of the site is bordered by the Southern Pacific railroad tracks. The actual plant, offices and storage areas are located at the rear of the property and occupy approximately 31,000 square feet of the total 89,300 square feet(2.05 acres). Approximately 66 percent of the property is vacant land. The facility is a combination of tilt-up concrete production area with a built-up roof which provides additional fire protection. The production area is 4,000 ft^2 and completely explosion-proof wired and heavy-duty sprinklered. The finished goods area is 12,000 ft^2 with heavy-duty sprinklers and in-rack sprinklers for storage of flammable finished goods. Storage and process areas have reinforced concrete floors. The production, finished goods, warehouse and drum storage areas are each surrounded by a berm to prevent uncontrolled releases. The production area is separately bermed with a curb approximately 4 inches high. This area also contains a putty mixer, filling machine and above-ground tanks. The warehouse area is separately bermed with a curb approximately 4 inches high around three sides with the non-curbed side floor sloped to the interior of the building. The drum storage area has a 10-inch reinforced concrete floor and is bermed with a curb approximately 7 inches high. A "clean room" which has a separate 6-inch high berm is located within the production area. The production area is separated from the finished goods area by a ramp with automatically closing fire doors. The physical characteristics of the loading and unloading areas are a combination of asphalt and concrete. The nearest off-site buildings are residential apartments. These apartments are about 50 feet from the property line on the northwest side.

Eight underground storage tanks were installed on site in December 1976. These tanks are tar-wrapped and constructed of single-wall mild steel. Chemicals stored in these underground tanks include the following:

Tank #	Capacity Gallon	Contents
1	12,000	Methylene Chloride
2	10,000	Paint Thinner
3	6,000	Paint Thinner
4	6,000	Denatured Alcohol
5	5,000	Methanol
6	6,000	Deodorized Kerosene
7	5,000	Lacquer Thinner
8	5,000	Acetone

Pentachlorophenol was stored in tank #3 until July 1985. Other chemicals stored on site include creosote, turpentine, toluene, methyl ethyl ketone, ispropanol, and xylene. Another 500 gallon underground tank of unknown age existed at the site and was used to store diesel fuel until 1987. The tank was present on site prior to Jasco's occupation and was removed on October 2, 1987. At the time of the removal the tank was corroded, and contained numerous small holes. Diesel fuel vapors were also present in the soil from beneath the tank.

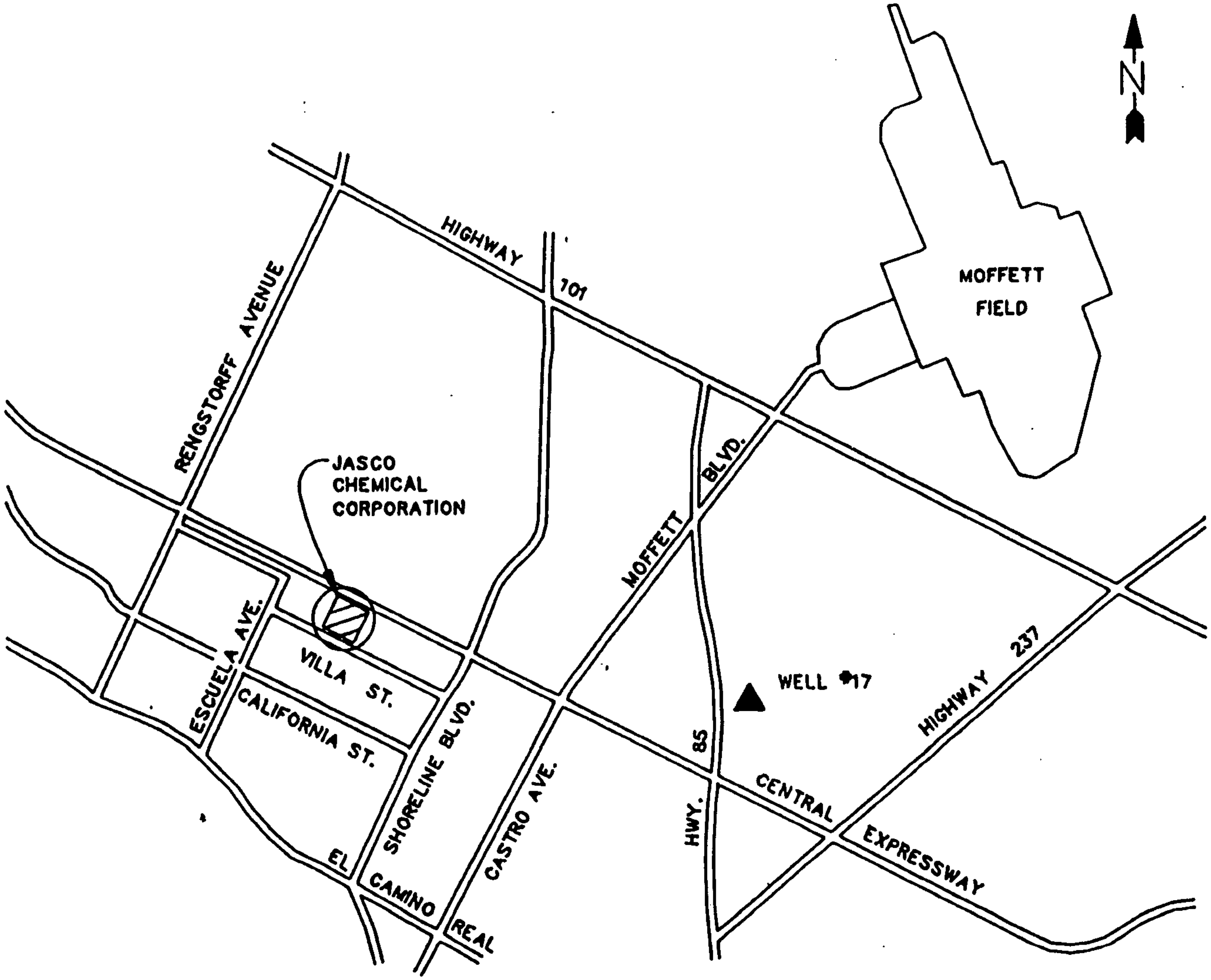


OHM Corporation

Figure 1.1

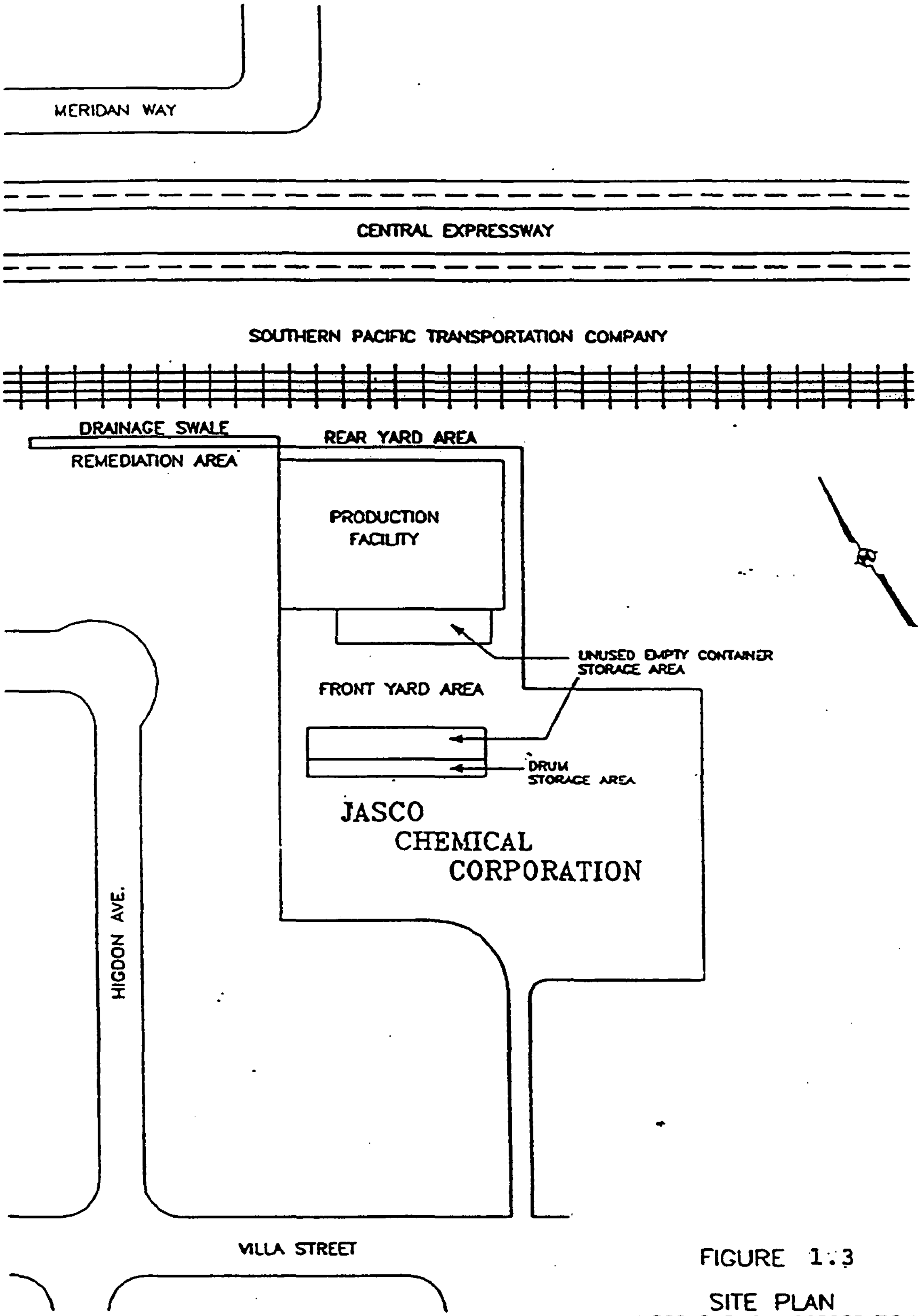
Site Location Map

Jasco Chemical Corporation
Mountain View, California



SITE

FIGURE 1.2
JASCO LOCATION MAP



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OHM CORPORATION WALNUT CREEK, CA

PLOT SCALE: 1" = 110'

FIGURE 1.3

SITE PLAN
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

PREPARED FOR

JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

OHM Corporation

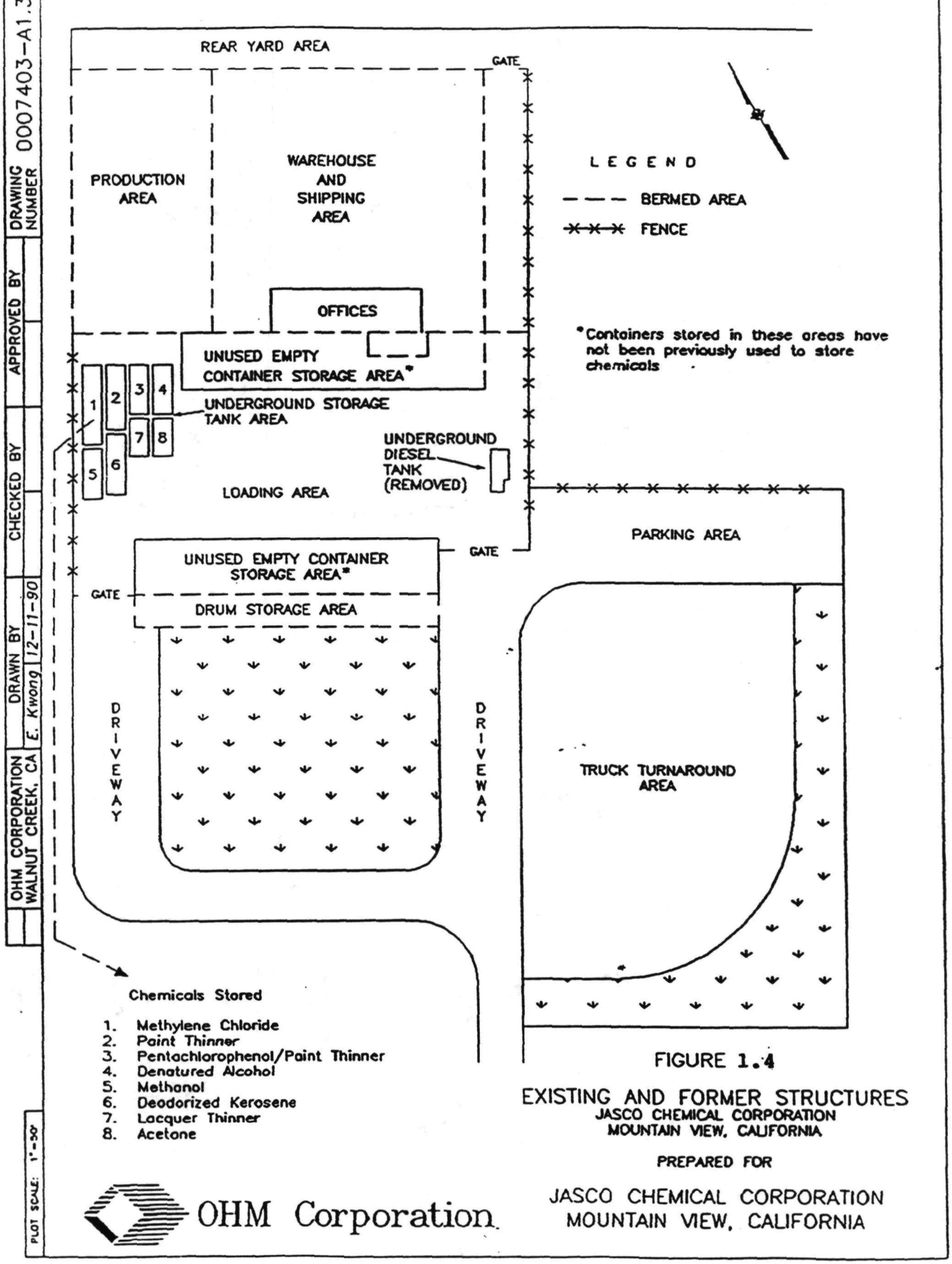

FIGURE 1.4

EXISTING AND FORMER STRUCTURES
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

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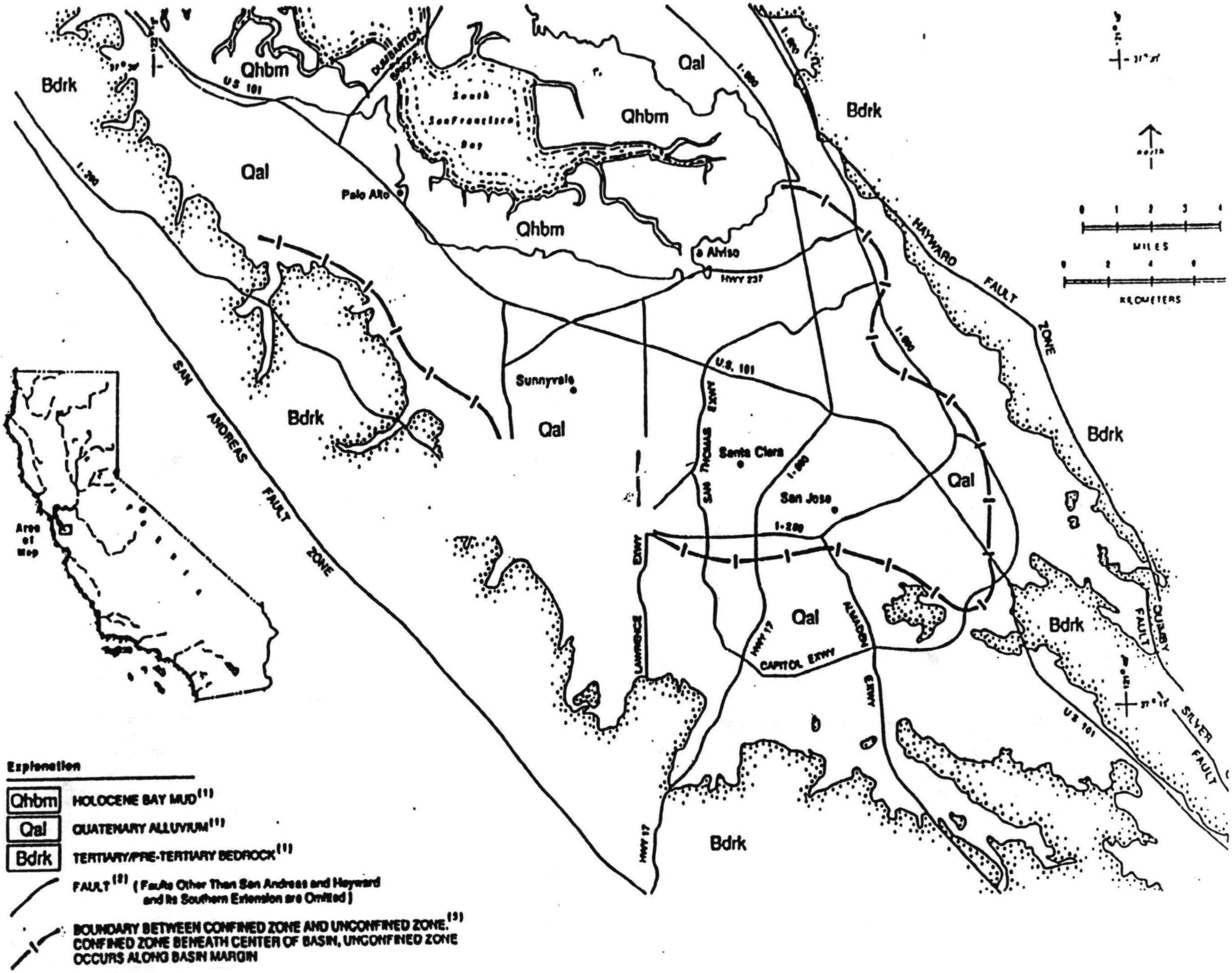
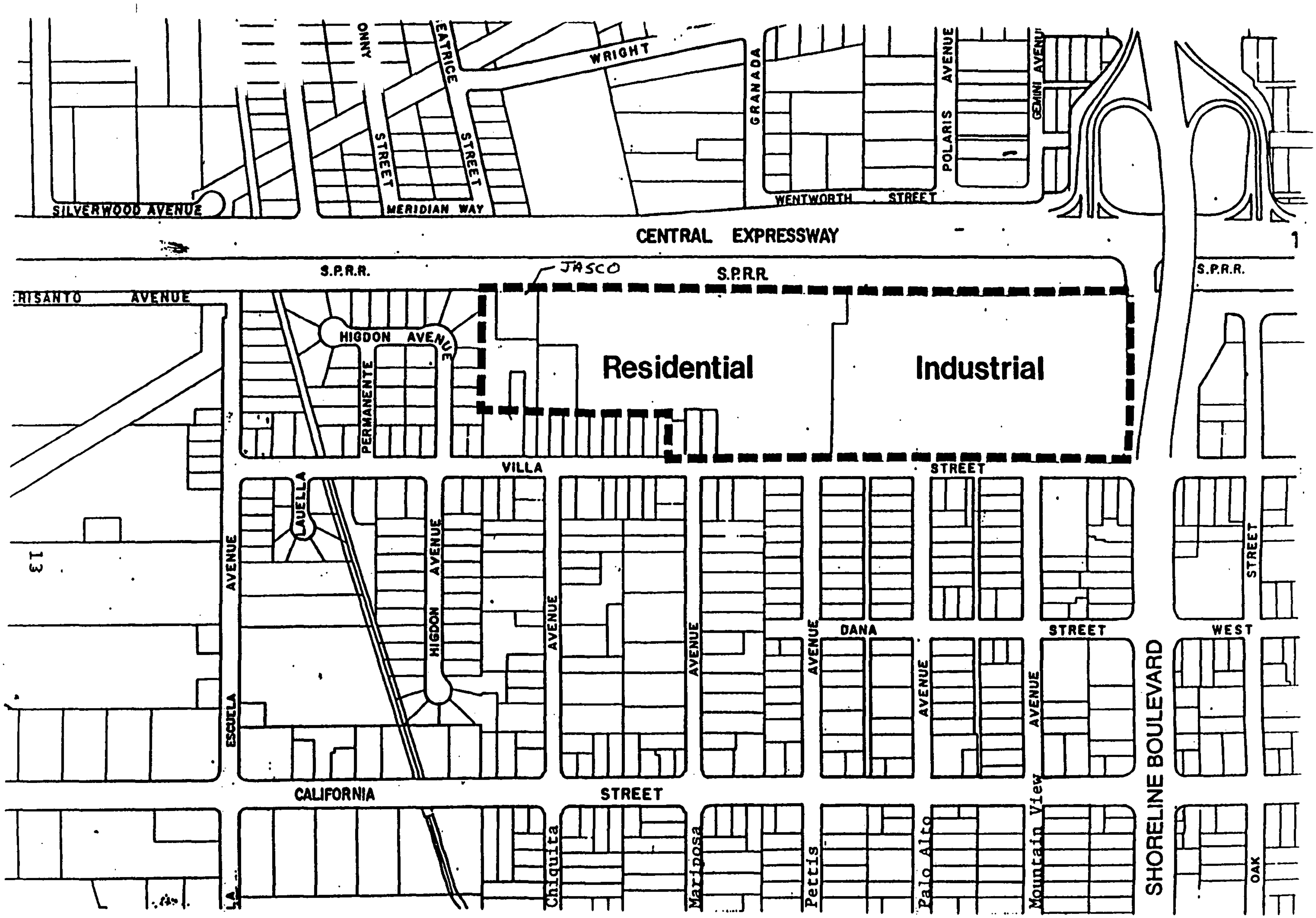

Qhbm
Bdrk
Qal
Qhbm
Qal
Bdrk
US 101
DUMBARTON BRIDGE
South San Francisco Bay
Palo Alto
Qhbm
Alviso
HWY 237
I-280
I-880
I-680
HAYWARD FAULT ZONE
Sunnyvale
Qal
Bdrk
SAN ANDREAS FAULT ZONE
U.S. 101
SAN TOMAS EXPWY
Santa Clara
San Jose
Qal
Bdrk
I-280
LAWRENCE EXPWY
HWY 17
ALMADEN EXPWY
CAPITOL EXPWY
Qal
Bdrk
CALAVERAS FAULT
SILVER CREEK FAULT
US 101
Bdrk
HWY 17
Area of Map
north
MILES
KILOMETERS
Explanation
Qhbm HOLOCENE BAY MUD(1)
Qal QUATERNARY ALLUVIUM(1)
Bdrk TERTIARY/PRE-TERTIARY BEDROCK(1)
FAULT(2) (Faults Other Than San Andreas and Hayward and Its Southern Extension are Omitted)
BOUNDARY BETWEEN CONFINED ZONE AND UNCONFINED ZONE.(3) CONFINED ZONE BENEATH CENTER OF BASIN, UNCONFINED ZONE OCCURS ALONG BASIN MARGIN

Figure 1.5



Villa- ariposa Area Precise Plan Map

Figure 1.6

N

1"=400'

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE OWNERSHIP

The Jasco property is approximately 2.05 acres and consists of one parcel of land. The property was originally settled under a Spanish land grant and is legally described as being a portion of Lot 7 of the Rancho Pastoria de Los Borregas. It is identifed by the Santa Clara County Assessor's office in Book 154 on Page 2 as Parcel 1.

A baseline of 1937 was used to investigate the historical and current ownership of the Jasco property. This baseline was based on preliminary investigation findings and was selected to identify ownership of the property pre-dating industrial zoning of the site. The documents reviewed establish historical ownership dating back to 1937. The first title transfer during this period occurred in 1951.

On December 4, 1951 the property was aquired by Tom N. Tibbs Corporation. The property was leased to West Coast Door Corporation from 1954 through June 1974. West Coast Door Corporation manufactured and painted commercial and residential doors on the site. The site was vacant from June 1974 through November 1976. Harry M. Anthony, president and owner of Jasco, purchased the property during September 1976. The deed was recorded on November 5, 1976, and Jasco started operations at the site during December 1976.

2.2 HISTORY OF SITE ACTIVITIES

Jasco's production process involves repackaging of bulk chemicals into small containers and blending of chemicals to produce proprietary products such as degreasers and paint thinners. Bulk solvents are received in tankers and stored in the eight underground tanks. Filling of the tanks is done by gravity. Powdered solids are received in 55-lb bags and other solvents are received in 55 gallon drums. In October 1984 a putty mixer was added for a new line of products. The putty consists of 85% filler - pigment and small quantities of linseed or soy bean oil.

2.3 HISTORY OF CONTAMINATION

After a private citizen complained of solvents being dumped at the site, in January 1983, the California Regional Water Quality Control Board (RWQCB) requested that monitoring wells be installed at the site to determine if the groundwater had been contaminated. A preliminary groundwater investigation in June 1984, by Questa Engineering Corporation revealed the presence of chemicals in the soil and groundwater of the same type as those used and/or stored at the Jasco facility.

Chemicals stored and used by the facility between 1983 and 1987 included the following:

Chemicals	gallons stored per year
1,1,1 trichloroethane	500
acetone	52,000
coal tar cresote	35,300
denatured alcohol	23,000
deodorized kerosene	18,000
lacquer thinner	72,000
methanol	30,000
methylene chloride	200,000
paint thinner	300,000

A subsequent groundwater sample obtained in April, 1985, showed the presence of pentachlorophenol and methylene chloride. High levels of contaminants were present in soils located in the drainage swale area at the rear of the facility. During the remedial investigation soil borings were completed in the drainage swale area, near the underground storage tanks, and south of the drum storage area.

Interim Remedial Actions

Since February 20, 1987, the company has been extracting contaminated groundwater from Well V-4. The extracted groundwater is discharged to the Mountain View sewer system under a permit from the city. 40 CFR Parts 400-424 provides effluent guidelines and standards. Permit provisions allow discharge as long as groundwater contaminant concentration levels do not exceed 1 part per million total toxic organic compounds (TTO). TTO is defined by 40 CFR 413.02 and the TTO must not exceed 750 parts per billion (ppb) for any one constituent.

On October 2, 1987, Jasco removed an underground diesel tank from the site. The tank was corroded with numerous small holes. Samples taken from directly beneath the tank contained diesel at concentrations of 360 parts per million (ppm), benzene at 3.0 ppm, toluene at 550 ppb and xylenes at 9.6 ppm.

During March of 1988 a tracer leak detection system was installed on the underground storage tank system. Tracer chemicals are periodically added to the tank contents. Soil gas samples are collected monthly from multiple probes located to a depth of 12 feet within and surrounding the tank farm. Each sample is analyzed for the tracer chemical to verify whether or not a release has occurred. In January 1990 the system detected tracer chemical coming from the paint thinner tank. This tank was decommissioned for a year even though the amount of the leak was below action levels. It was subsequently put back into service when testing showed that it was not leaking at action levels.

The primary source of chemicals detected within the vadose zone can be found in the rear of the facility. The drainage swale receives surface water runoff from both the south side of the facility and points to the east. In the past surface runoff flowed into a drain on the south side of the facility and then entered an underground pipe. This pipe ran north under the building and then connected with an east-west underground pipe on the north side of the facility. The east-west underground pipe emptied into the drainage swale which is adjacent to the northwest corner of the site. The discharged water ponded, evaporated and/or percolated into the soil in this drainage swale area.

During August 1988 Jasco submitted to the RWQCB a soils characterization report and runoff management plan. Soil contamination in the drainage swale included methylene chloride at 3,400,000 parts per billion (ppb); trichloroethylene at 490,000 ppb; toluene at 1,700,000 ppb; and acetone at 270,000 ppb. During October 1988, Jasco responded to the soil characterization report by excavating 572 cubic feet of soil from the drainage swale area. The excavation depth extended to the groundwater table (22-28 feet). The area was excavated by drilling with overlapping large diameter augers. The soil was disposed of at the Casmalia Resources Facility in Casmalia, California.

A Surface Runoff Collection System was installed to prevent further surface water infiltration across the drainage swale area in early 1989. This system consists of a 10 millimeter thick polyethylene liner that prevents surface water percolation. The area is also graded such that surface runoff is angled toward a sump located in the drainage swale area. Water is pumped out of this area into the sanitary sewer line. Surface water in the front yard area is collected in a large dumpster for timed release into the sanitary sewer line.

2.4 HISTORY OF ENFORCEMENT ACTIONS

On August 3, 1987, the Regional Water Quality Control Board (RWQCB) issued Cleanup and Abatement Order No. 87-094. The Order required Jasco to conduct a remedial investigation and to submit certain technical reports according to a specified schedule. EPA evaluated the Jasco site according to the Hazard Ranking System and the site received a score of 35.36. This site was proposed for inclusion on the National Priorities List on June 24, 1988 (53 FR 23988) and then became subject to regulation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. On December 21, 1988, EPA issued the U. S. Environmental Protection Agency's Administrative Order Docket No. 89-01 requiring Jasco to complete a Remedial Investigation/Feasibility Study. In Update Number 9 issued in October 4, 1989 (54 FR 41015), Jasco was listed on the National Priorities List.

Responsible Party Determination

EPA completed a Potentially Responsible Party Search for the Jasco Chemical Corporation Superfund site during January 1989. This search identified Jasco Chemical Corporation as a potentially responsible party for the contamination at the 1710 Villa Street facility due to the handling and disposal practices conducted by the company. The current owners and operators of the site, Harry M. Anthony, Carol Jean Anthony and Lois M. Conley have been identified as potentially responsible parties due to their ownership of the property.

3.0 COMMUNITY RELATIONS

A Community Relations program has been ongoing for all Santa Clara Valley Superfund sites, including the Jasco Chemical Company site, and the requirements for public participation under CERCLA Section 113(k)(2)(B)(i-v) have been met. The Remedial Investigation/Feasibility Study and Proposed Plan for the Jasco Chemical Company site was released to the public on June 7, 1992. These two documents were made available to the public in both the administrative record and an information repository maintained at the EPA offices in San Francisco, CA and the Mountain View Public Library. EPA published a notice in the *San Jose Mercury News* on Sunday, June 7, 1992 announcing the RI/FS, Proposed Plan and opportunity for public comment at an evening public meeting in the Mountain View City Hall Council Chambers on June 24, 1992. A thirty day public comment period on the RI/FS Report and the Proposed Plan ran from June 7, 1992 to July 6, 1992. The public notice also was published in the *Los Altos Town Crier* on Wednesday, June 10th, and June 24th. An article discussing the Proposed Plan and public meeting was also published in the local city paper entitled, *The View*. *The View* is a monthly informational periodical funded by the City of Mountain View, and was delivered on the first of June to every residential and business address in the city. A presentation of the proposed final cleanup plan was made at the June 24, 1992 public meeting. Representatives from the community, EPA, Jasco, and contractors attended the public meeting. EPA staff answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision.

Fact Sheet 1, mailed in July 1988 announced the proposed addition of Jasco to the National Priorities List and discussed the future submittal of the Remedial Investigation Work Plan. Fact Sheet 2 was mailed in January 1991 to residences and businesses located within a 1 mile radius of the site. Information in this fact sheet discussed results of the Remedial Investigation Study, and announced future submittal of the Risk Assessment and the Feasibility Study report. Fact Sheet 3 was mailed in June 1992 to over 8,000 homeowners and businesses in Mountain View, local government officials, environmental organizations and interested individuals. This fact sheet discussed the proposed plan, cleanup standards, and opportunity for public comment at an evening meeting.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

This Record of Decision addresses the entire site which consists of contaminated soils, groundwater, and surface water. This action addresses the contaminated groundwater and soils which are a principal threat at this site. Site soils pose a principal threat due to risks posed from migration of contaminants into the groundwater. The purpose of this response action is to prevent any further migration of contaminants into the groundwater, prevent possible future exposure to the public of contaminated groundwater, and to prevent contamination of the drinking water aquifer. The response actions will be performed to meet the final site treatment standards listed in **Table 4.1.** These levels are based on Applicable or Relevant and Appropriate Requirements (ARARS) and health protection criteria for groundwater (see **Table 4.4**).

Thirty-one chemicals were detected in the soils, groundwater, and surface water. Sixteen chemicals have been identified as the chemicals of concern in the groundwater and soil. Cleanup standards have been assigned to all chemicals of concern.

The selected remedy presented herein addresses the documented potential threats from the site to groundwater and soil. Surface water concerns have been addressed by interim actions. Treatment of the contaminated groundwater will significantly reduce further horizontal migration of contaminants and prevent the possibility of contaminants migrating into the drinking water aquifer. Treatment of contaminated soils will reduce toxicity and mobility of contaminants and prevent contamination of the groundwater. Cleanup standards for all contaminants of concern shall be met. The health-based cleanup standards for soil were developed based on the assumption that the groundwater would be used for potable and domestic purposes. Health-based cleanup standards for groundwater were derived based on the groundwater ingestion and inhalation pathways under a reasonable maximum exposure residential use scenario. The final groundwater cleanup standards selected were either federal or state maximum contaminant levels, whichever is more health protective. The health-based cleanup standards for soil were then estimated using the health-based cleanup standards for groundwater (MCLs), Summer's analytical leachate model and site-specific hydrogeologic conditions. The final cleanup standards for the chemicals detected in soils will provide a level of protection necessary for residential use and prevent contaminant concentration in groundwater from exceeding MCLs.

SOIL CONTAMINATION

There are currently no ARARs established for cleanup levels in contaminated soil. The highest concentrations of contaminants detected in soils prior to the 1988 excavation and post excavation are depicted in **Table 4.2**. Approximately 1100 yd^3 of contaminated soil is present in the drainage swale area. The volume of contaminated soil in the underground storage tank area, and beneath the production facility shall be quantified after the building is razed. This action will require soil sampling to determine the exact amount of soil to be treated in these areas. The sampling plan shall be approved by EPA prior to the performance of any data collection, and shall follow the protocols approved in the site Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP). All soils determined to be contaminated shall be treated to the cleanup standards specified in **Table 4.1.** Contaminated soils located in the former diesel tank area exceed cleanup levels for benzene and toluene and shall be treated to the cleanup standards specified herein. PRC Management Inc. under contract to EPA reviewed the original baseline risk assessment and developed health-based standards for chemicals of concern in soils at the site. The purpose of soil treatment is to reduce the contamination to a level that no longer threatens to contaminate groundwater at levels above MCL's.

GROUNDWATER CONTAMINATION

Contaminated groundwater flows in a northeast direction along the hydraulic gradient of the shallow zone potentiometric surface. Groundwater flow within the A-aquifer is deflected towards well V-4 due to the groundwater extraction system. In 1987 a 400 foot plume of contaminated groundwater existed beneath the site and spread into the median of the Central Expressway. Since 1987 the groundwater plume has been reduced by approximately 100 feet (see Figure 5.1). Groundwater in the deep aquifer does not currently contain elevated levels of contaminants. The highest concentrations of contaminants detected in past groundwater analyses are: 1,1 dichloroethane (2,200 ppb) 1,2 dichloroethane (2580 ppb), 1,1 dichloroethene (170 ppb) methylene chloride (142,000 ppb), and vinyl chloride (16 ppb). **Table 4.3** shows historical groundwater quality data. Cleanup standards for 1-1 DCA, 1,1-DCE, methylene chloride, and vinyl chloride and pentachlorophenol were exceeded in the samples collected from January 1991 through January 1992.

The Superfund program uses EPA's Groundwater Protection Strategy (U.S. EPA, 1984) for determining groundwater value and vulnerability to contamination. EPA has classified the groundwater at the Jasco site as Class IIB, which is groundwater that is potentially available for drinking water, agriculture, or other beneficial use. The shallow groundwater is also considered a potential source of drinking water by the State of California. The federal criteria for underground drinking water sources are set forth in 40 CFR 143, and EPA has determined that site groundwater does meet the federal criteria to be determined an underground drinking water source.

The groundwater cleanup standards for the Jasco Superfund site (see **Table 4.4**) are based on EPA Maximum Contaminant Levels (MCLs), California Department of Health Services (DHS) MCLs (adopted), DHS Action Levels and Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles.

TABLE 4.1

SUMMARY OF SELECTED CLEANUP STANDARDS FOR GROUNDWATER AND FOR SOIL BASED ON POTENTIAL CONTAMINANT MIGRATION TO GROUNDWATER

	Federal MCL (mg/L)	Gr. Water STANDARDS gr. water (mg/L)	CLEANUP STANDARDS FOR SOIL (SCSsl) (mg/Kg)
A. Carcinogen-MCL			
Benzene (A)	0.005	0.001	0.3
1,1-Dichloroethane (C)		0.005	0.6
1,1-Dichloroethene (C)	0.007	0.006	2
1,2-Dichloroethane (B2)	0.005	0.0005	0.03
Methylene chloride (B2)	0.005	0.005	0.2
Pentachlorophenol (B2)	0.001	0.001	200
Tetrachloroethene (B2)	0.005	0.005	7
Trichloroethene (B2)	0.005	0.005	3
Vinyl chloride (A)	0.002	0.0005	0.02
B. Noncarcinogen-MCL			
c-1,2-Dichloroethene	0.07	0.006	1
Ethylbenzene	0.7	0.68	3000
Toluene	1	1	1000
1,1,1-Trichloroethane	0.2	0.2	100
Xylenes	10	1.75	2000
C. Noncarcinogen w/o MCL			
Acetone		4	30
Chloroethane		30*	4000
Diesel or kerosene mixture		3	10000
Methanol		20	200
Methyl ethyl ketone		0.6	9

NOTES: Methylene chloride is the limiting chemical (EPA, 1991b). SCS – Selected Cleanup Standard
MCL – Maximum contaminant level
Gray = Selected Standards
1 mg/l = 1000 ppb

TABLE 4.2

HIGHEST CONCENTRATIONS DETECTED IN SOIL

CONSTITUENT	SELECTED CLEANUP STANDARD (mg/kg)	MAX. CONC. IN SITE SOIL AFTER INTERIM REMEDIATION (*) (mg/kg)	MAX. CONC. IN SITE SOIL PRIOR TO INTERIM REMEDIATION (*) (mg/kg)
1,1-Dichloroethane (1,1-DCA)	0.6	3	3400
1,1-Dichloroethene (1,1-DCE)	2	1.7	13
1,2-Dichloroethane (1,2-DCA)	0.03	nd	3.9
1,2-Dichloroethene (1,2-DCE)	1	0.015	4
1,1,1-Trichloroethane (1,1,1-TCA)	100	61	1500
Acetone	30	100	270
Benzene	0.3	3	3
Chloroethane	4,000	nd	nd
Diesel or Kerosene Mixture	10,000	6,700	11,000
Ethylbenzene	3,000	1.2	170
Methanol	200	60	60
Methyl Ethyl Ketone	9	na	na
Methylene Chloride	0.2	21	3,400
Pentachlorophenol	200	nd	0.2
Tetrachloroethene (PCE)	7	4	16
Toluene	1000	110	1,700
Trichloroethene (TCE)	3	0.05	490
Vinyl Chloride	0.02	nd	nd
Xylene	2,000	37	210

* date of soil interim remediation = October 1987
mg/kg = parts per million

TABLE 4.3

MAXIMUM CONCENTRATIONS DETECTED
IN
SHALLOW GROUNDWATER

parts per billion

CONTAMINANTS	1984-1989 ppb	1990 ppb	1991 ppb	cleanup standard ppb
Acetone	1700	100	<10	4000
Benzene	20	<5	<5	1
1,1 Dichloroethane	7800	290	650	5
1,1 Dichloroethene	190	38	38	6
1,2-Dichloroethane	2600	<5	<5	0.5
Methylene Chloride	142000	53	150	5
Pentachlorophenol	50	23	<5	1
Tetrachloroethene (PCE)	8	<5	<5	5
Toluene	250	<5	<5	1
Total Petroleum Hydrocarbons	33000	1100	620	3000
Vinyl Chloride	16	5	6	0.5

TABLE 4.4

STANDARDS, PROPOSED STANDARDS AND ACTION LEVELS
DRINKING WATER SOURCES
CALIFORNIA AND FEDERAL REGULATIONS

CONSTITUENT	STATE		FEDERAL				
	MCL (1) (mg/l)	AAL (2) (mg/l)	MCL (3) (mg/l)	Proposed MCL (3) (mg/l)	Proposed SMCL (4) (mg/l)	Proposed MCLG (5) (mg/l)	MCLG (5) (mg/l)
Benzene	0.001	0.0002	0.005	-	0.0	0.0	
Carbon Tetrachloride	0.0005	-	0.005	-	-	-	-
Chloroform	-	0.006	0.100	-	-	-	-
1,1-Dichloroethane	0.005	-	-	-	-	-	-
1,2-Dichloroethane	0.0005	-	0.005	-	-	-	-
1,2-Dichlorethene	0.006	-	0.07	-	0.07	0.07	-
Ethylbenzene	0.68		0.7	-	0.30	0.7	-
Methyl Ethyl Ketone	-	2.0	-	-	-	-	-
Methylene Chloride	-	2.0	0.005(1/94)	-	-	0.0	-
Pentachlorophenol	-	-	0.001(1/93)	-	0.03	0.0	-
Tetrachloroethene	-	0.002	0.005	-	-	0.0	-
Toluene	0.005	-	1.0	-	0.04	1.0	-
1,1,1-Trichloroethane	-	2.0	0.2	-	-	0.2	-
Trichloroethene	0.2	0.3	0.005	-	-	0.0	-
Vinyl Chloride	0.0005	0.007	0.002	-	-	0.0	-
Xylenes	1.75	2.0	10.0	-	0.02	10.0	-

(1) Maximum Contaminant Level for Primary Drinking Water Soures (22 CCR 644)
(2) Applied Action Levels for risk appraisal, California Dept. of Health Services, 1989
(3) Maximum Contaminant Level - Safe Drinking Water Act (42 U.S.C. Pub. L. 93-523)
(4) Proposed Secondary Maximum Contaminant Level - Safe Drinking Water Act (42 U.S.C. Pub. L. 93-52
Safe Drinking Water Act (42 U.S.C. Pub. L. 93-523)
(5) Maximum Contaminant Level Goal (40 CFR 141, Subpart F)

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 SOURCES OF CONTAMINATION

The Remedial Investigation focused on the distribution of volatile organic compounds in soil, groundwater, and surface water at the site. Thirty-one chemicals were detected during the course of the investigation, and fourteen of the thirty-one were detected infrequently and/or at very low concentrations. Seventeen chemicals were identified as indicator chemicals as defined in the Superfund Public Health Evaluation Manual, OSWER Directive 9285.4-1. (USEPA 1988). The final indicator contaminant list consists of the following; 1,2-dichloroethane, 1,1-dichloroethene, trichloroethene, vinyl chloride, benzene, tetrachloroethene, methylene chloride, 1,1-dichloroethane, and pentachlorophenol.

The soil and groundwater investigations identified primary areas where releases of compounds occurred. These areas are: the location of the underground storage tanks; the drainage swale area, the location of the former diesel tank, and beneath the production facility.

5.2 DESCRIPTION OF CONTAMINATION

GROUNDWATER

Jasco has installed and sampled fifteen monitoring wells in the vicinity of the site to define the extent of groundwater contamination (see **Figure 5.1**). All of these wells are useful for defining the extent and nature of the groundwater plume. Twelve wells are completed in the A-aquifer (22 to 35 feet below ground surface "bgs"), and three are completed in the B_1 aquifer (42 to 57.5 feet bgs). A-aquifer well V2 was destroyed in 1988 by Jasco without EPA approval. EPA has determined that groundwater in the shallow aquifer is a potential source of drinking water.

Groundwater flows in the shallow aquifer towards the northeast (see **Figure 5.2**). Groundwater contamination has been found in the shallow aquifer within a 400 foot area. **Table 4.3** shows the maximum contaminant concentrations in the shallow aquifer. Groundwater contamination extends under the median of the Central Expressway. Current data show that the plume extends under the Southern Pacific Railroad track.

Groundwater samples collected from wells that are located onsite show high contaminant concentrations. Soils in the vicinity of Well V-4 contained some of the highest contamination at the site. Based on the second quarter 1992 sampling report, only concentrations of contaminants in 2 of the fifteen wells in the shallow aquifer exceed MCLs. The concentrations of 1,1 DCA (380 ppb), 1,1 DCE (55 ppb), methylene chloride (18 ppb), and vinyl chloride (10 ppb) exceed their respective MCLs in well V4. The MCL for methylene chloride (36 ppb) is exceeded in well V3. Well V4 with the highest average contaminant concentration, 380 ppb 1,1 DCA, is located in the drainage swale area (screened interval at 28 to 35 feet); well V3 is located close to the underground storage tank (screened interval at 22 to 35 feet).

SURFACE WATER

The drainage swale area was a pathway for the lateral migration of contaminants dissolved in surface runoff. The following contaminants exceeded the California State Action levels for surface waters: methylene chloride (1300 ppb), pentachlorophenol (200 ppb), 1,1,1-TCA (700 ppb), and 1,1-DCA (56 ppb).

The construction of the surface runoff collection system has limited the amount of contaminants migrating within surface runoff in the drainage swale area. Surface runoff from the front yard area flows to the north or northeast and collects near the production building. Surface runoff from the rear yard area collects in the drainage swale area. The runoff management system directs all on-site runoff to several concrete sumps. This water is then pumped from the sumps and stored on-site in storage tanks before being discharged to the sanitary sewer system. Jasco's discharge permit requires that no contaminant in the effluent shall exceed 750 ppb and the total toxic organic level of the effluent shall be less than 1000 ppb.

SOIL

Soils contaminated with chemicals of concern have been found in the drainage swale area, the underground storage tank area, the former diesel fuel tank area, and the drum storage area. Contamination is also suspected to have occurred beneath the production facility. Jasco shall be required to provide a sampling plan for investigation of the soils beneath the production facility. The production building shall be razed after 1995 and this sampling plan shall be used to ensure that no source area on site shall be left untreated.

During October 1988 572 yd^3 of contaminanted soils were removed **(see shaded area on Figure 5.2)**. Excavation terminated at the depth at which groundwater was encountered, typically between 22 and 28 feet. Soil samples were collected from the bottom of the excavation after the excavation was complete. The concentrations of chemicals detected in soil ranged from 0.179

ppm to 53 ppm. The highest total chemical concentrations were found in the easternmost portion of the drainage swale area. Concentrations decreased towards the west. Fourteen chemicals were detected in samples collected from the bottom of the excavation borings. The concentration of the chemicals found in these borings included methylene chloride (21 ppm), acetone (30 ppm), paint thinner (11.0 ppm) and xylenes (5 ppm). The significance of these concentrations can be found by examining the soil cleanup standards listed in Table 4.1.

The surface area of the entire drainage swale area is approximately 19 feet wide by 200 feet long. This area has been subdivided into three units: DS-1, DS-2, and DS-3 (see Figure 5.2). The estimated surface area of DS-1 is 680 ft^2. The total volume of soil within DS-1 is estimated at 755 yd^3 (depth to groundwater of 30 feet). DS-2 stretches 160 feet to the west of area DS-1 and contamination extends approximately three feet below ground surface (bgs). The surface area of DS-2 is approximately 3,040 ft^2 (19 feet wide by 160 feet long) with soil volume estimated at 340 yd^3. DS-3 is the site of the 1988 excavation (572 yd^3 soil removed) with an estimated surface area of 460 ft^2.

Chemicals of concern were also detected in the underground storage area as deep as 36 feet bgs. Contaminants found in this area include 1,1 DCE (37 ppb), 1,1,1-TCA (39 ppb), acetone (219 ppb), isopropanol (984), methanol (1408 ppb), methylene chloride (322 ppb), and toluene (38 ppb). Methylene chloride was the only contaminant detected in this area above its soil cleanup standard of 200 ppb.

Soil contaminated with methylene chloride was detected in soil borings completed in areas south of the drum storage areas (less than 3 ppm). Methlyene chloride (.250 ppm), benzene (3 ppm), toluene (.55 ppm), and xylene (9.6 ppm) were also detected in borings completed in the location of the former diesel storage tank area. Only the cleanup standards for methylene chloride and benzene are exceeded in this area.

5.3 CONCLUSION

Data used to develop the Feasibility Study, to select remedial alternatives and to develop conclusions and clean-up standards presented in this Record of Decision were based on the following data quality requirements:

1) All data were collected under the guidance of a Quality Assurance Project Plan developed under EPA protocols and reviewed and approved by EPA Quality Assurance Management staff.

2) All data were collected in accordance with procedures presented in an approved Sampling and Analysis Plan. The Sampling and Analysis Plan was developed in accordance with EPA Region 9 guidance and was reviewed and approved by EPA staff.

3) Random sample splits were collected by EPA to confirm the validity of data generated.

4) Selected data was validated by EPA and found to be qualitatively and quantitatively acceptable.

5) There has been reasonable repeatability of the data based on years of monitoring.

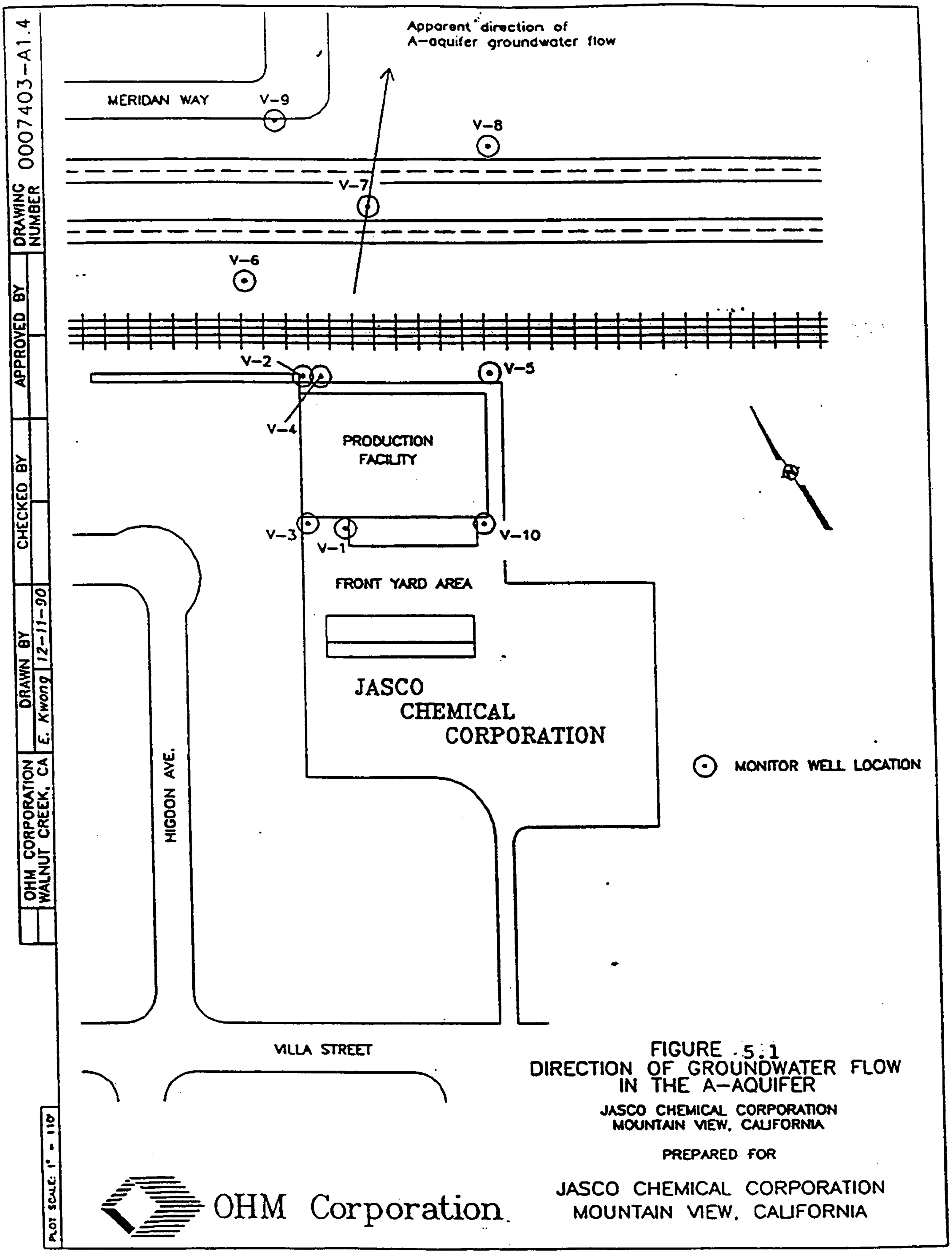


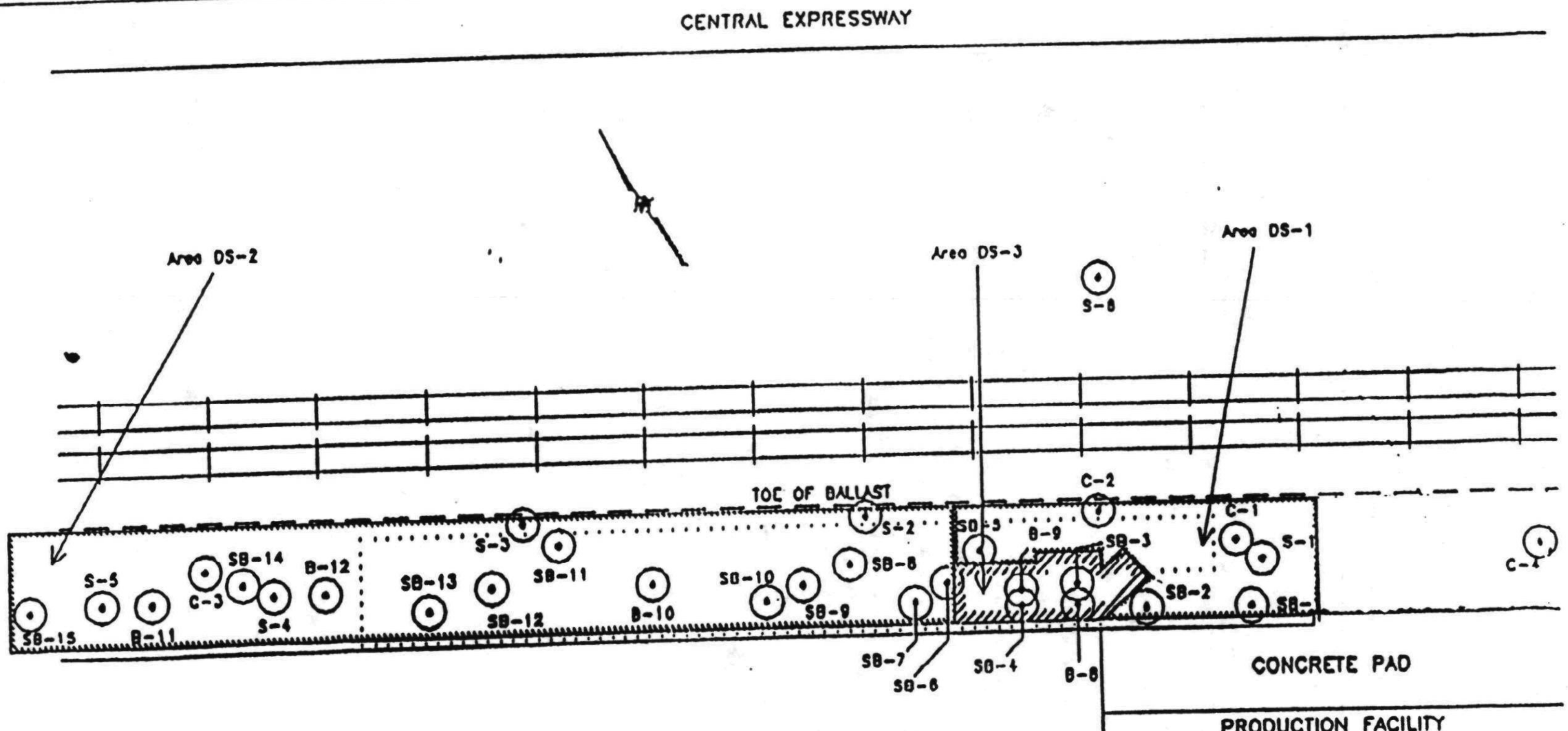
FIGURE 5.1
DIRECTION OF GROUNDWATER FLOW
IN THE A-AQUIFER
JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

PREPARED FOR

JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CALIFORNIA

	OHM CORPORATION WALNUT CREEK, CA	DRAWN BY E. Kwong 12-18-90	CHECKED BY	APPROVED BY	DRAWING NUMBER 0007402-A4.1

PLOT SCALE = 1"=30'



Legend

⊙ Borehole Location

...... Impermeable Membrane Runoff Collection System

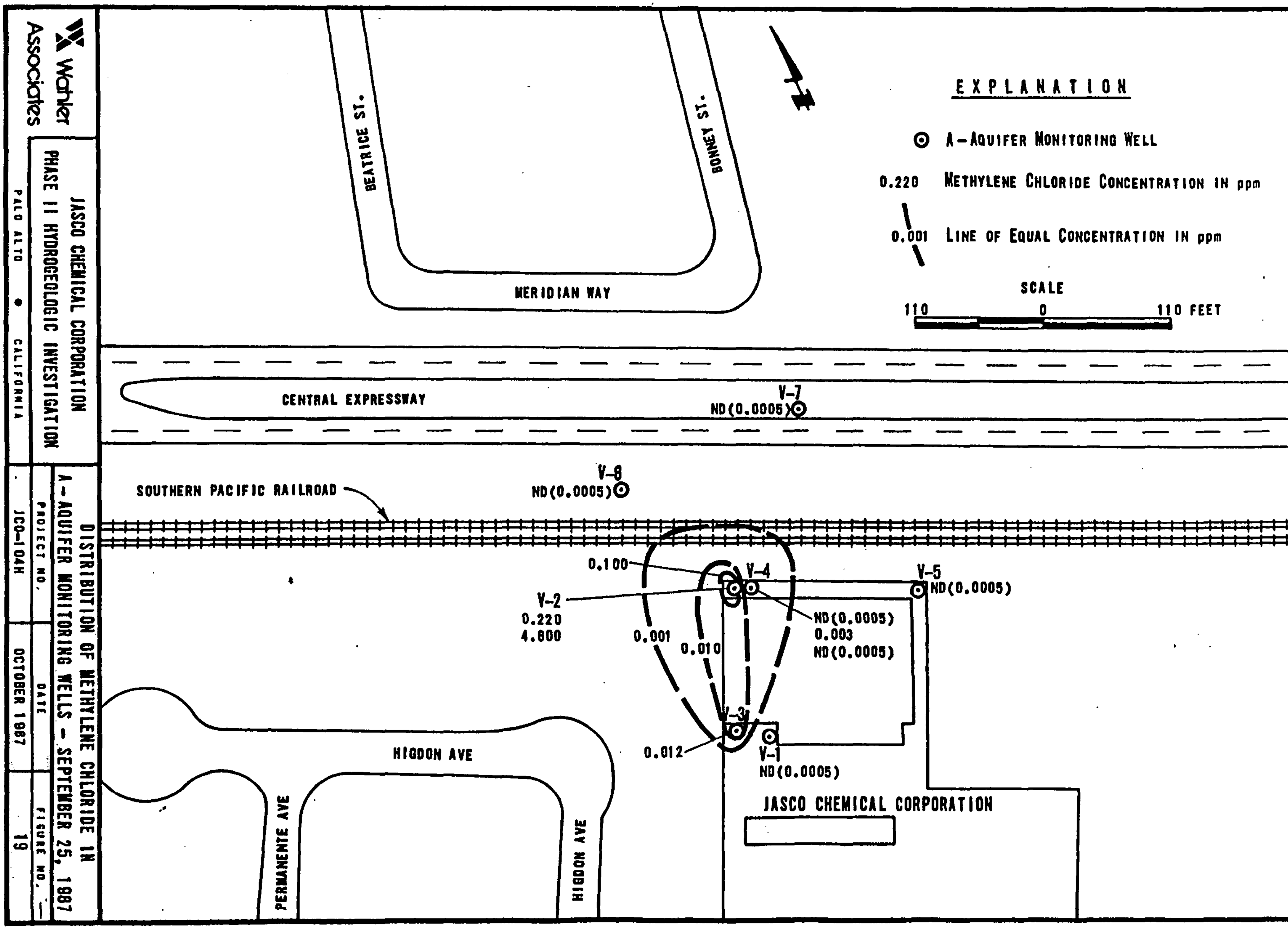
FIGURE 5.2
LOCATION OF SAMPLE POINTS AND DELINEATION OF DRAINAGE SWALE AREAS

JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA

PREPARED FOR

JASCO CHEMICAL CORPORATION
MOUNTAIN VIEW, CA

OHM Corporation



Wahler Associates
JASCO CHEMICAL CORPORATION
PHASE II HYDROGEOLOGIC INVESTIGATION
PALO ALTO • CALIFORNIA
DISTRIBUTION OF METHYLENE CHLORIDE IN A-AQUIFER MONITORING WELLS - SEPTEMBER 25, 1987
PROJECT NO.
JCO-104H
DATE
OCTOBER 1987
FIGURE NO.
19
EXPLANATION
A-AQUIFER MONITORING WELL
0.220 METHYLENE CHLORIDE CONCENTRATION IN ppm
0.001 LINE OF EQUAL CONCENTRATION IN ppm
SCALE
110 0 110 FEET
BEATRICE ST.
BONNEY ST.
MERIDIAN WAY
CENTRAL EXPRESSWAY
V-7
ND(0.0005)
V-8
ND(0.0005)
SOUTHERN PACIFIC RAILROAD
0.100
V-4
V-5
ND(0.0005)
V-2
0.220
4.600
ND(0.0005)
0.003
ND(0.0005)
0.001
0.010
V-3
0.012
V-1
ND(0.0005)
JASCO CHEMICAL CORPORATION
HIGDON AVE
PERMANENTE AVE
HIGDON AVE

6.0 SUMMARY OF SITE RISKS

A baseline risk assessment was prepared by EPA's contractor, Jacobs Engineering Group, during August 1989. This risk assessment identified potential current and future exposure pathways. Exposure to contaminants was not expected to occur under current land-use. A future residential use scenario identified high potential for exposure if private wells were installed in the area of the plume. Air and soil exposure pathways were complete but exposure is likely only if surface soils are disturbed.

PRC Environmental Management, Inc, EPA's contractor, also completed a document entitled "Baseline Risk Estimation and Derivation of Health-Based Standards for the Contaminated Soils at the Jasco Superfund Site", dated May 4, 1992. This document derived preliminary and final health-based standards for the chemicals of concern in the soils, based on their potential to migrate into the groundwater. The preliminary selected cleanup standards for chemicals of potential concern in soils were derived from the final groundwater health based standards which are based on the federal or state maximum contaminant levels (whichever is more stringent). The baseline cumulative health risks posed by the chemicals of potential concern were also calculated based on an assumption that groundwater is used for potable and domestic purposes.

6.1 CONTAMINANT IDENTIFICATION

During the remedial investigation thirty-one chemicals were detected in soil and groundwater at the Jasco facility. Fourteen of the total were detected infrequently and/or at very low concentrations. The chemicals that pose a significant hazard at the site were identified by following a series of steps recommended in the "Superfund Public Health Evaluation Manual and Exposure Assessment Manual".

Chemicals of potential concern are listed in **Table 6.2 and 6.3** along with their toxicological classification, excess cancer risk, and hazard index. **Table 6.4** depicts the historical frequency of detection for contaminants found in A-aquifer groundwater. Sixteen chemicals of concern were identified within the Study Area.

EPA assigns weight-of-evidence classifications to chemicals that may be potential carcinogens. Under this system, chemicals are classified as either Group A, Group B1, Group B2, Group C, Group D, or Group E. Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer. Groups B1 and B2 chemicals (probable human carcinogens) are agents for which there is limited (B1), or inadequate (B2) evidence of carcinogenicity from human studies, but for which there is sufficient evidence of carcinogenicity from animal studies. Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals, and Group

D chemicals (not classified as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available. Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity in adequate human or animal studies. Several of the chemicals of concern at the Jasco site have been classified in Group B2 and two have been classified as Group A.

The reasons for selecting the listed chemicals as indicator chemicals are as follows:

1. Each of the indicator chemicals were consistently detected in the samples collected throughout the plume area. **Table 6.4** lists detection freqencies for these compounds.

2. Each of the indicator chemicals possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote their dispersion in groundwater. In addition, they are all quite volatile and can easily escape into soil gas or the atmosphere.

3. Benzene and vinyl chloride were identified as group A carcinogens. Most of the indicator chemicals are potential carcinogens. 1,2-DCA, methylene chloride, PCP, PCE, TCE, and vinyl chloride were identified by EPA as probable human carcinogens (Group B2) based on available laboratory animal data. 1,1-DCA and 1,1-DCE were identified by EPA as possible human carcinogens (Group C) based on available laboratory animal data. TCA remains unclassified as a potential carcinogen because there is inadequate evidence of its carcinogenicity in animal studies. Acetone, chloroethane, ethylbenzene, methanol, methyl ethyl ketone, and xylene are noncarcinogens.

4. The 1,1-DCA is a potential breakdown product of the contaminant 1,1,1-TCA. TCE breaks down into DCE and ultimately vinyl chloride which has been detected at this site. TCE, PCE and dichloroethane are commonly found in degreasers and paint thinners which are produced by Jasco.

EXPOSURE ASSESSMENT

The baseline assessment identified potential exposure pathways or scenarios that were examined under two distinct timeframes. The current land use and potential future land-uses were identified. The current land use involves industrial use of the property and the future use is residential.

Human exposure to contaminants is not expected to occur under the current land-use because the soil is not being disturbed and access is limited. The potential receptors for contaminants in the soils located in the drainage swale area would be Jasco employees and trespassers.

Potential exposure pathways include those related to contaminated groundwater. Potential human exposure pathways for contaminants include ingestion of and direct contact with groundwater, and inhalation of volatilized contaminants during showering by area residents. Residential areas are located 50 feet northwest of the site.

Currently, chemicals in the groundwater do not come into contact with humans, plants, or animals. Neither the A or B_1 aquifer is currently being used for drinking water purposes. The municipal water supply wells descend to the the C-aquifer which occurs at a depth of approximately 150 feet below the surface. The closest drinking water supply well to the Jasco facility is Mountain View Well #17 located on Rengstorff Avenue which is less than one mile away. The closest surface water in the immediate vicinity of the facility is Permanente Creek located about 600 feet northwest of the site. Future exposure could occur during excavation of the site, if the shallow groundwater was used for drinking water purposes or if contaminants migrated into the C-aquifer.

TOXICITY ASSESSMENT

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Table 6.5 and 6.6 shows the potential exposure pathways that were developed in the Jasco Risk Assessment under current land-use and future land-use conditions.

6.2 RISK CHARACTERIZATION

A Baseline Risk Assessment (BRA) dated August 1989, was prepared by Jacobs Engineering Inc. under contract to EPA. The BRA was conducted to evaluate current and potential future health risks posed by the Jasco Superfund site. Since the potential for exposure to contaminated soils by way of dermal absorption and/or incidental ingestion is assumed to be very low to non-existent (because the soil is not being disturbed), no current risk was identified at the Jasco site. Potential future health risks are based on exposures that could occur in the future if untreated shallow zone groundwater was used for human consumption and residential development occurred on the Jasco site. To ensure that human health is protected, the BRA incorporated conservative assumptions. Therefore, it is unlikely that the actual risks posed by the Jasco site in the future would be greater than estimated. Average case and maximum case scenarios are presented in the BRA. The information below refers to the maximum case scenarios.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation(e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. If the noncarcinogenic Hazard Index is less than one, EPA considers the combined intake of chemicals unlikely to pose a health risk.

Using the above hypothetical scenario of future groundwater use, the carcinogenic risk from ingestion and inhalation of VOCs at the Jasco site is 4×10^{-2}. A carcinogenic risk of 4×10^{-2} is equal to four excess occurrences of cancer in a population of 100. This exceeds EPA's acceptable carcinogenic risk range for cleanup standards selected for a site: 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1,000,000).

Using the same scenario, the noncarcinogenic Hazard Index for ingestion and inhalation of VOCs from the use of shallow groundwater is 87. This elevated Hazard Index is caused by a methylene chloride concentration of 142,000 ppb which is a historical high for the site. During 1991 the highest level of methylene chloride detected on site was 150 ppb.

Thus the carcinogenic risk and Hazard Index associated with a "no action" remedy exceed EPA's acceptable carcinogenic risk and Hazard Index range. **Table 6.2** shows the calculation of the carcinogenic risk and noncarcinogenic hazard index for baseline risks posed by domestic use of on-site contaminated groundwater. **Table 6.3** shows the baseline risks posed by on-site contaminated soils based on potential contaminant migration to groundwater. Overall, methylene chloride contributes nearly 90 percent of the total carcinogenic risk and 85 percent of the total noncarcinogenic hazard and is the limiting chemical, which simply means a chemical(s) that is responsible for much of the baseline risk assessment, because of either high toxicity and/or presence in high concentrations at the site. Methylene chloride is a class B2 carcinogen; it has been shown to cause liver cancer in animals, but there is inadequate or no evidence of carcinogencity in humans. 1,2-dichloroethane contributes the next highest percent of the total carcinogenic risk. The concentrations of methylene chloride have decreased over the last few years. In 1991 the highest concentration detected was 150 ppb. Site cleanup will probably depend on cleanup of 1,2-dichloroethane which continues to exceed its groundwater cleanup standard. The carcinogenic risk at the cleanup standards (for all chemicals listed on **Table 6.7**) associated with the potential future use scenario of groundwater ingestion and inhalation of VOCs from groundwater, using the maximum exposure scenario is 1×10^{-4}. Methylene chloride and 1,2-dichloroethane are the limiting chemicals, therefore in cleaning up these chemicals to their respective cleanup standards the concentrations of other VOCs will be reduced to levels below their cleanup standard(s). The carcinogenic risk for methylene chloride at its cleanup standard is 8.0×10^{-7}, and the risk for 1,2-dichloroethane at its cleanup standard is 3.0×10^{-6}. These risks were calculated using a potential future use scenario with a 30 year duration exposure per EPA guidance.

The selected remedy is protective of human health and the environment -- as required by Section 121 of CERCLA -- in that contamination in groundwater shall be treated to at least MCLs and falls within EPA's acceptable carcinogenic risk range (10^{-6} to 10^{-4}) and noncarcinogenic Hazard Index of less than one (0.042).

As shown on Table 6.7, the groundwater cleanup standards for all contaminants are Federal or State (MCLs), either adopted or proposed, whichever is more stringent. Table 4.1 shows the final groundwater and soil cleanup standards for the Jasco Superfund site. The final cleanup standards for the chemicals detected in the shallow zone, when achieved, would result in a future carcinogenic risk level for groundwater ingestion and inhalation of contaminants of 1×10^{-4}.

6.3 PRESENCE OF SENSITIVE HUMAN POPULATIONS

In order for a chemical to pose a human health risk, a complete exposure pathway must be identified. The greatest potential for exposure to chemicals at the site would be from residential use of groundwater. The closest residences are approximately 50 feet northwest. The Jasco site will be used for residential use in the future. The closest school (within a half mile) is Castro Elementary School located at 505 Escuela Drive with approximately 680 students.

6.4 PRESENCE OF SENSITIVE ECOLOGICAL SYSTEMS

Two endangered species are reported to use South San Francisco Bay, which is approximately 4.5 miles north of the site. The California clapper rail and the salt marsh harvest mouse are reported to exist in the tidal marshes of the Bay and bayshore. The endangered California brown pelican is occasionally seen in the Bay Area, but does not nest in the South Bay. Ranges of the endangered American peregrine falcon and southern bald eagle include the Bay Area, but these species do not use Bay and bayshore habitats. The Jasco Site does not constitute critical habitat for endangered species nor does it include or impact any wetlands.

6.5 CONCLUSION

Actual or threatened releases of hazardous substances from the Jasco Superfund site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to the public health, welfare or environment. Based on the fact that a variety of the chemicals detected in the Study Area pose significant health risks as carcinogens or as noncarcinogens and complete exposure pathways will exist under future residential land use, EPA has determined that remediation is required.

TABLE 6.1

CONSTITUENTS IDENTIFIED DURING REMEDIAL INVESTIGATION

CONTAMINANTS	Detected Infrequently and/or at Very Low Concentrations
(c) 1,2-Dichloroethene	
(t) 1,2-Dichloroethene	
1,1,1-Trichloroethane	
1,1-Dichloroethane	
1,1-Dichloroethene	
1,2-Dichloroethane	
1-Methoxy, 2-Propanone Phenol	X
Acetone	
Benzene	
Bromodichloromethane	X
Carbon Tetrachloride	X
Chlorobenzene	X
Chloroethane	
Chloroform	X
Ethanol	X
Ethylbenzene	
Isopropanol	X
Methanol	X
Methyl Ethyl Ketone	
Methylene Chloride	
Miscellaneous Hydrocarbons	X
Pentachlorophenol	X
Phenol	X
Tetrachloroethylene	
Toluene	
TPH as Diesel	X
TPH as Kerosene	X
TPH as Paint Thinner	X
Trichloroethene	
Vinyl Chloride	
Xylenes	

Table 6.2

Baseline Risks Posed By On-Site Contaminated Ground Water

Chemical	GW Maximum Concentration (MC) (mg/L)	Weight-of Evidence	Carcinogenic HBSgw (mg/L) (a)	Excess Cancer Risk (b)	Relative Cancer Contribution % (c)	Noncarcinogenic HBSgw (mg/L) (d)	Hazard Index (e)	Relative HI Contribution % (c)
Acetone	1.8					4E+00	4.9E-01	0.57
Benzene	0.02	A	6E-04	3E-05	0.08			
Chloroethane (f)	0.18					3E+01	6.2E-03	0.01
1,1-Dichloroethane	2.2	C	9E-04	2E-03	5.71	8E-01	2.9E+00	3.30
1,1-Dichloroethene	0.17	C	7E-05	3E-03	6.18	3E-01	5.2E-01	0.60
1,2-Dichloroethane	2.58	B2	2E-04	1E-02	31.80			
cis-1,2-Dichloroethene	0.013					4E-01	3.6E-02	0.04
Diesel or kerosene mixture (g)						3E+00		
Ethylbenzene	0.057					2E+00	3.5E-02	0.04
Methanol (g)						2E+01		
Methylene chloride	142	B2	6E-03	2E-02	54.67	2E+00	8.1E+01	93.39
Methyl ethyl ketone (f)	0.15					6E-01	2.5E-01	0.29
Pentachlorophenol	0.05	B2	7E-04	7E-05	0.17	1E+00	4.6E-02	0.05
Tetrachloroethene	0.008	B2	1E-03	5E-06	0.01	4E-01	2.2E-02	0.03
Toluene	0.36					3E+00	1.1E-01	0.13
1,1,1-Trichloroethane	2.04					2E+00	1.3E+00	1.52
Trichloroethene	0.019	B2	3E-03	7E-06	0.02			
Vinyl chloride (f)	0.016	A	3E-05	6E-04	1.36			
Xylenes	0.062					2E+00	3.3E-02	0.04
TOTAL RISK				4E-02	100.00		8.7E+01	100.00

NOTES: Methylene chloride and 1,2-dichloroethane are limiting chemicals (5). Blank means there are no available toxicity values

(a) Carcinogenic HBSgw -- Health-based standard for ground water was based on the ingestion and inhalation routes (residential RME) and a target excess cancer risk of 1E-06 (Table 3).
(b) Excess Cancer Risk = 1E-06 * (MC / carcinogenic HBSgw).
(c) Relative Contribution = (Chemical-specific Risk / Total Risk) * 100.
(d) Noncarcinogenic HBSgw -- Health-based standard for ground water was based on the ingestion and inhalation routes (residential RME) and a target hazard index of 1 (Table 4).
(e) Hazard Index = 1 * (MC / noncarcinogenic HBSgw).
(f) Chemical was found in ground water but was not detected in soils.
(g) Chemical found in soils but not reported for ground water.

TABLE 6.3
BASELINE RISKS POSED BY ON-SITE CONTAMINATED SOILS BASED ON POTENTIAL CONTAMINANT MIGRATION TO GROUND WATER

Chemical	Maximum Concentration (MC) (mg/Kg)	Weight-of Evidence	Carcinogenic HBSs (mg/Kg) (a)	Excess Cancer Risk (b)	Relative Cancer Contribution % (c)	Noncarcinogenic HBSsl (mg/Kg) (d)	Hazard Index (e)	Relative HI Contribution % (c)
Acetone	278					3E+01	8.5E+00	13.38
Benzene	3	A	2E-01	1E-05	0.09			
Chloroethane (f)						4E+03		
1,1-Dichloroethane	27	C	1E-01	2E-04	1.41	9E+01	2.9E-01	0.45
1,1-Dichloroethene	13	C	2E-02	7E-04	4.39	9E+01	1.5E-01	0.23
1,2-Dichloroethane	3.98	B2	1E-02	4E-04	2.12			
cis-1,2-Dichloroethene	4.6					7E+01	6.6E-02	0.10
Diesel or kerosene mixture	7000					1E+04		
Ethylbenzene	170					7E+03	2.3E-02	0.04
Methanol	60					2E+02		
Methylene chloride	3400	B2	2E-01	2E-02	89.81	6E+01	5.4E+01	84.64
Methyl ethyl ketone (f)						9E+00		
Pentachlorophenol	0.2	B2	2E+02	1E-09	0.00	2E+05	8.5E-07	0.00
Tetrachloroethene	16	B2	2E+00	7E-06	0.04	5E+02	3.0E-02	0.05
Toluene	1700					3E+03	5.1E-01	0.81
1,1,1-Trichloroethane	22					1E+03	2.3E-02	0.04
Trichloroethene	+490	B2	1E+00	4E-04	2.14			
Vinyl chloride (f)		A	1E-03					
Xylenes	91					2E+03	4.4E-02	0.07
TOTAL RISK				2E-02	100.00		6.4E+01	100.00

NOTES: Methylene chloride is the limiting chemical (5). Blank means there are no available toxicity values.

(a) Carcinogenic HBSsl -- Health-based standard for soil was estimated based on the potential contaminant migration to ground water and a target excess cancer risk of 1E-06 (Table 3).
(b) Excess Cancer Risk = 1E-06 * (MC / carcinogenic HBSsl).
(c) Relative Contribution = (Chemical-specific Risk / Total Risk) * 100.
(d) Noncarcinogenic HBSsl -- Health-based standard for soil was estimated based on the potential contaminant migration to ground water and a target hazard index of 1 (Table 4).
(e) Hazard Index = 1 * (MC / noncarcinogenic HBSsl).
(f) Chemical was found in ground water but was not detected in soils.

TABLE 6.4
HISTORIC FREQUENCY OF THE DETECTION OF TARGET CONSTITUENTS IN A-AQUIFER GROUNDWATER SAMPLES 1984 TO 1991

Target Constituent	Historic Frequency of Detection of Target Constituents in Groundwater Samples **												All **
	V-1	V-2	V-3	V-4	V-5	V-6	V-7	V-8	V-9	V-10	V-11	V-12	
1,1,1-TCA	1/21	12/12	6/21	34/34	0/13	4/13	20/21	13/15	1/10	1/11	0/4	0/4	92/179
1,1-DCA	15/21	11/12	16/21	34/34	0/13	0/13	21/21	1/15	10/10	0/11	0/4	0/4	108/179
1,1-DCE	2/21	5/12	3/21	33/34	0/13	0/13	17/21	1/15	0/10	0/11	0/4	0/4	61/179
1,2-DCA	0/21	2/11	1/21	3/32	0/13	0/13	0/21	0/16	0/10	0/11	0/4	0/4	6/176
1,3-Dichlorobenzene	0/2	2/11	0/19	0/10	0/3	0/3	0/3	0/2	0/1	0/2	0/0	0/0	2/56
Trans-1,2-DCE	2/21	2/11	6/21	0/30	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	10/169
4-Nitrophenol	1/19	0/3	0/18	0/20	0/9	0/9	0/8	0/4	0/4	0/4	0/0	0/0	1/97
Acetone	4/35	2/3	3/34	4/39	1/15	0/17	1/22	1/26	0/17	3/18	0/9	0/9	19/239
Benzene	0/21	2/7	1/22	0/31	0/13	1/13	0/22	0/15	0/10	0/11	0/4	0/4	4/173
Bromoform	0/20	0/11	0/21	1/31	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	1/173
Carbon Tetrachloride	0/20	0/11	0/21	0/31	0/13	0/13	1/20	0/15	0/10	0/11	0/4	0/4	1/173
Chlorobenzene	0/19	2/9	0/21	1/31	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	3/170
Chloroethane	1/20	5/11	0/21	25/31	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	31/173
Chloroform	0/20	0/11	0/21	0/31	0/13	0/13	1/21	0/15	0/10	0/11	0/4	0/4	1/173
Dibromochloro-methane	0/19	1/11	0/21	2/30	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	3/171
Ethanol	2/22	1/3	1/21	2/21	0/9	0/9	0/10	0/18	0/8	1/9	0/5	0/5	7/135
Ethylbenzene	0/20	2/6	0/21	0/28	0/13	0/13	0/20	0/15	0/10	0/10	0/4	0/4	2/164
Isopropanol	1/22	1/3	0/21	1/21	0/9	0/9	0/10	0/13	0/8	1/9	0/5	0/5	4/135
Methanol	3/22	0/3	3/21	2/21	0/9	0/9	0/10	0/13	1/8	0/9	0/5	0/5	9/135
Methyl Ethyl Ketone	1/4	3/7	0/4	0/6	0/3	0/3	0/3	0/1	0/1	0/0	0/0	0/0	7/32
Methylene Chloride	10/22	13/13	10/22	19/34	0/13	0/13	1/21	0/15	0/10	3/11	0/4	0/4	56/182
Pentachlorophenol	2/20	0/3	1/19	0/20	0/9	0/8	0/8	0/4	0/4	0/4	0/0	0/0	3/99
Phenol	0/19	0/3	0/18	1/20	0/9	0/8	0/8	0/4	0/4	0/4	0/0	0/0	1/97
Tetrachloroethene	0/20	2/11	0/21	0/30	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	2/172
Toluene	0/20	4/7	0/22	3/29	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	8/168
TPH as diesel	10/19	0/0	11/19	10/17	0/5	0/5	0/5	0/5	0/5	0/6	0/0	0/0	31/86
TPH as thinners	4/15	0/2	1/15	3/14	0/7	0/7	0/7	0/3	0/3	0/4	0/0	0/0	8/84
Trichloroethene	0/21	4/11	0/22	0/30	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	4/174
Vinyl Chloride	0/20	3/11	1/20	8/31	0/13	0/13	1/20	0/15	0/10	0/11	0/4	0/4	13/172
Xylene	0/21	5/7	2/20	0/27	0/13	0/13	0/20	0/15	0/10	0/11	0/4	0/4	7/164

* - Ratio between number of samples in which constituent was detected at a level exceeding the analytical detection limit and the total number samples analyzed for the constituent.

** - Includes results of analyses from all well locations.

TABLE 6.5

POTENTIAL PATHWAYS OF EXPOSURE TO CONTAMINANTS ORIGINATING AT THE JASCO SITE UNDER POTENTIAL FUTURE LAND-USE CONDITIONS

Exposure Medium	Potential Routes of Exposure	Potential Receptors	Pathway Complete	Potential for Substance Exposures
Soil	Dermal absorption, incidental ingestion.	Construction workers and on-site residents	Yes, if surface is disturbed.	Moderate, periodic and short-term.
Air	Inhalation of VOCs.	Nearby residents Construction workers on site residents.	Yes. If surface is disturbed.	Very low, high volatility and dispersion.
	Fugitive dust.	Construction workers on-site residents.	Yes If surface disturbed.	Moderate, periodic and short-term
Ground Water	Ingestion, inhalation, dermal absorption.	Local populations	Yes, if private well installed in area of plume.	High

TABLE 6.6

POTENTIAL PATHWAYS OF EXPOSURE TO CONTAMINANTS ORIGINATING AT THE JASCO SITE UNDER CURRENT LAND-USE CONDITIONS

Exposure Medium	Potential Routes of Exposure	Potential Receptors	Pathway Complete	Potential for Substance Exposures
Soil	Dermal absorption, incidental ingestion	Workers, trespassers	No Contaminants are contained within 3-10 ft. depth interval.	None
Air	Inhalation of VOCs and/or fugitive dust	Workers, trespassers Local population downwind of site.	No Contaminants are contained within 3-10 feet depth interval.	Very Low
Ground Water	Ingestion, inhalation, dermal aborption.	Local population. of Mt. View	No, public water supplemented with water from wells outside area of influence. No private wells are in use.	None

TABLE 6.7
SUMMARY OF FEDERAL/STATE MCL/AL, SELECTED CLEANUP STANDARDS FOR GROUND WATER (SCSgw) AND HEALTH RISKS RELATED TO SCSgw

CHEMICAL (Weight-of-Evidence) (a)	EPA Current MCL (mg/L) (b)	EPA Proposed MCL (mg/L) (b)	CA State MCL/AL (mg/L) (b)	SCS for Gr. Water (SCSgw) (mg/L) (c)	SCSgw-Related Cancer Risk (d)	SCSgw-Related Hazard Index (e)
A. Carcinogen-MCL						
Benzene (A)	0.005		0.001	0.001	2E-06	
1,1-Dichloroethane (C)			0.005	0.005	5E-06	6.5E-03
1,1-Dichloroethene (C)	0.007		0.006	0.006	9E-05	1.8E-02
1,2-Dichloroethane (B2)	0.005		0.0005	0.0005	3E-06	
Methylene chloride (B2)	0.005		0.04 AL	0.005	8E-07	2.9E-03
Pentachlorophenol (B2)	0.001 **		0.03 AL	0.001	1E-06	9.1E-04
Tetrachloroethene (B2)	0.005 *		0.005	0.005	3E-06	1.4E-02
Trichloroethene (B2)	0.005		0.005	0.005	2E-06	
Vinyl chloride (A) (f)	0.002		0.0005	0.0005	2E-05	
A. SUBTOTAL (g)					1E-04	4.2E-02
B. Noncarcinogen-MCL (h)						
c-1,2-Dichloroethene	0.07 *		0.006	0.006		1.6E-02
Ethylbenzene	0.7 *		0.68	0.68		4.2E-01
Toluene	1 *		0.1 AL	1		3.1E-01
1,1,1-Trichloroethane	0.2		0.2	0.2		1.3E-01
Xylenes	10 *		1.75	1.75		9.2E-01
B. SUBTOTAL					0E+00	1.8E+00
C. Noncarcinogen w/o MCL (h)						
Acetone				4		1.0E+00
Chloroethane (f)				30		1.0E+00
Diesel or kerosene mixture				3		1.2E+00
Methanol				20		1.1E+00
Methyl ethyl ketone (f)				0.6		1.0E+00
C. SUBTOTAL					0E+00	5.3E+00
CUMULATIVE TOTAL					1E-04	5.4E+00

NOTES: Methylene chloride is the limiting chemical (EPA, 1991b). Blank means no data

* – To be effective in 7/92
** – To be effective in 12/92
MCL – Maximum contaminant level
SEC – Secondary
AL – Action level
EPA – U.S. Environmental Protection Agency
CA – State of California
SCS – Selected Cleanup Standard (from Table 5)

(a) SCSs for chemicals with weight-of-evidence designation were based on carcinogenic effects. The ones without weight-of-evidence were based on noncarcinogenic effects.

(b) Reference: EPA, 1991c

(c) For chemicals with MCLs available, selected cleanup standards for ground water (SCSgw) is the federal or state MCL, whichever is more stringent. For chemicals without MCLs, the SCSgw is the final HBSgw (Table 5).

(d) SCSgw-related excess cancer risk = 1E-06 * (SCSgw/HBSgw), with HBSgw based on carcinogenic effects (Table 3).

(e) SCSgw-related hazard index = 1 * (SCSgw/HBSgw), with HBSgw based on noncarcinogenic effects (Table 4).

(f) Chemical detected in ground water but not reported in soil.

(g) 1,1-Dichloroethene, a class C carcinogen with equivocal carcinogenicity evidence, contributes significant excess cancer risk at its SCSgw.

(h) Chemicals that pose a cumulative significant noncarcinogenic hazard at SCSgw levels, but found at concentrations much lower than the SCSgw.

7.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Pursuant to section 121(d)(1) of CERCLA, remedial actions must attain a degree of clean-up which assures protection of human health and the environment. Additionally, remedial actions must meet standards, requirements, limitations, or criteria that are "applicable or relevant and appropriate" (ARARs). Federal ARARs for any site include the requirements of federal environmental laws.

State ARARs include promulgated requirements under state environmental or facility-siting laws that are more stringent than Federal ARARs and have been identified to EPA by the state in a timely manner.

Applicable requirements are those clean-up standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site.

Relevant and appropriate requirements are defined as those cleanup standards and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, nevertheless address problems or situations sufficiently similar to those encountered at the CERCLA site to indicate that their use is well-suited to the particular site. If no ARAR addresses a particular situation, or if an ARAR is insufficient to protect human health or the environment, then non-promulgated standards, criteria, guidances, and advisories (To Be Considered, or TBCs) must be used to provide a protective remedy.

Additionally, response actions which take place off-site must comply with all laws applicable at the time the off-site activity occurs, both administrative and substantive.

Types of ARARs

There are three types of ARARs. The first type includes "contaminant specific" requirements. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards.

The second type of ARAR includes "location-specific" requirements that set restrictions on certain types of activities based on site characteristics. These include restrictions on activities in wetlands, floodplains, and historic sites.

The third type of ARAR includes "action-specific" requirements. These are technology-based restrictions which are triggered by the type of action under consideration. Examples of action-specific ARARs are Resource Conservation and Recovery Act (RCRA) regulations for waste treatment, storage, and disposal.

ARARs are identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

The following section will outline the Applicable or Relevant and Appropriate Requirements (ARARs) that apply to this site.

A. CONTAMINANT-SPECIFIC ARARs

The contaminant-specific ARARs for the site are Federal Maximum Contaminant Levels (MCLs) and more stringent State of California MCLs. Each is relevant and appropriate as a cleanup standard for the site. A list of Federal and State MCLs which are ARARS are presented in Table 4.4.

1. Federal Drinking Water Standards

Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. §300g-1, "National Drinking Water Regulations"; National Primary Drinking Water Regulations, 40 CFR Part 141.

Relevant and appropriate drinking water regulations are MCLs for specific contaminants. MCLs are enforceable standards at the tap which apply to specified contaminants which EPA has determined have an adverse effect on human health.

Accordingly, the appropriate remedial standard for groundwater is the current federal or state MCL, whichever is more stringent. Table 6.7 compares the current state and federal MCLs for the chemicals of concern and identifies the cleanup standard.

2. State Drinking Water Standards

California Safe Drinking Water Act, Health & Safety Code, Div. 5, Part 1, Chapter 7, § 4010 et seq., California Domestic Water Quality Monitoring Regulations, CAC Title 22, Division 4, Chapter 15, §64401 et seq.

The California Safe Drinking Water Act sets forth requirements governing public water systems, and provides for drinking water quality standards. California has promulgated MCLs for primary VOCs as shown in Table 4.4. EPA has determined relevant & appropriate the California MCLs for primary VOCs as the groundwater cleanup standard for the site where the California MCLs, for VOCs, were more stringent than federal MCLs.

B. ACTION-SPECIFIC ARARs AND TBCs

The action-specific ARARS for the site address requirements for the treatment, storage, or disposal of contaminated soil, and for pumping and treating groundwater using liquid phase carbon adsorption.

1. Treatment by Liquid Phase Carbon Adsorption

Solid Waste Disposal Act, as amended by Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq.

Use of granular activated carbon (GAC) for remediation of VOCs triggers requirements associated with regeneration or disposal of the spent carbon. RCRA, as implemented pursuant to California's approved RCRA program, found at 22 CCR §§66260.1-67450.5 (California Hazardous Waste Control Law), is relevant and appropriate. Spent carbon is a characteristic waste, and is regulated as a hazardous waste under RCRA and the California RCRA program. Spent carbon must be disposed of at a permitted hazardous waste disposal facility.

Containers used for storage of hazardous waste on site for more than 90 days must be:

- Maintained in good condition (22 CCR §66264.171);
- Compatible with other stored wastes (22 CCR §66264.172);
- Closed during storage (22 CCR §66264.173);
- Placed on a sloped, crack-free base with containment system in place capable of handling 10 percent of the free liquids stored (22 CCR §66264.175);
- Placed 50 feet from the facility's property line if ignitable or reactive (22 CCR §66264.176);
- Separated by a dike or other barrier if incompatible wastes are stored near each other (22 CCR §66264.178);
- At closure, all hazardous wastes and residues from contaminant system must be removed (22 CCR §66264.178)
- Storage of wastes restricted from land disposal is prohibited unless certain conditions are met (22 CCR §66268.50).

On site storage of contaminated carbon triggers substantive requirements under state law (Hazardous Waste Control Law, 22 CCR Division 4.5). Secondary containment is required for storage of hazardous wastes over 90 days. As the spent carbon is a hazardous waste, construction and monitoring requirements for storage facilities also apply.

2. RCRA and Hazardous Solid Waste Amendment (HSWA) Standards
(42 U.S.C. §§6901-6987)

Remedial activities that involve the excavation or removal of hazardous wastes, on-site management of these substances, or removal to off-site facilities must be in compliance with standards under RCRA and amendments to RCRA enacted through the HSWA standards, as implemented by State regulations authorized under

RCRA. Any soil found contaminated with VOCs must be disposed of in accordance with the State RCRA program.

The following RCRA requirements, as implemented by the State regulations, are relevant and appropriate to remedial actions for the site.

- Hazardous Waste Management System: General (22 CCR §66260.1 et seq.)

- Identification and Listing of Hazardous Waste (22 CCR §66261 et seq.).

- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (22 CCR §66264.1 et seq.) in particular:

  Article 2 - General Facility Standard
  Article 3 - Preparedness and Prevention
  Article 5 - Manifest System, Record-Keeping, and Reporting for Offsite Transport and Disposal
  Article 6 - Groundwater Monitoring
  Article 7 - Closure and Postclosure
  Article 9 - Use and Management of Containers
  Article 12 - Waste Piles
  Article 16 - Miscellaneous Units

- Land Disposal Restrictions (22 CCR §66268.1 et seq.)

HSWA and state regulations restrict the land disposal of hazardous waste and specifies treatment standards that must be met before these wastes can be land disposed.

3. **California Hazardous Waste Control Laws (Health & Safety Code, Div. 20, Chapter 6.5, Articles 2, 4, 4.5, 5, 6, 6.5 and 7.7)**

The California hazardous waste control laws establish standards governing hazardous waste control; management and control of hazardous waste facilities; transportation; laboratories; and classification of hazardous and nonhazardous waste.

The California Hazardous Substances Act, Health & Safety Code Div. 22, Chapter 13, Sections 28743 and 28745, provides definitions of "hazardous substance" and "toxic". Criteria for identification of hazardous waste thresholds are found in 22 CCR, Div. 4.5, Chapter 11. Criteria include the Soluble Threshold Limit Concentration (STLC) and the Total Threshold Limit Concentration (TTLC). STLC and TTLC chemical-specific values reflect the chemical characteristics of persistence and bioaccumulation.

Title 22 CCR, Division 4.5, Chapter 14 establishes standards for owners and operators of hazardous waste treatment and storage facilities.

These standards are relevant and appropriate to the site, and thus are ARARs for the site.

4. <u>Underground Storage Tank Requirements</u>

State regulations governing underground storage tank monitoring, repairs, releases, and closures, found at Health & Safety Section 25280 <u>et seq.</u> and 23 CCR Sections 2670 - 2672 apply to this site. Existing underground storage tanks at the site will be removed and remediation of that area will be required. No new tanks will be installed.

5. <u>Clean Air Act, 42 U.S.C. §7401 et seq.</u>

The Clean Air Act regulates air emissions to protect human health and the environment, and is the enabling statute for air quality programs and standards. The substantive requirements of programs provided under the Clean Air Act are implemented primarily through Air Pollution Control Districts. The following Bay Area Air Quality Management District rules regarding emissions of VOCs are applicable to remedial actions that may result in air emissions:

Reg. 8, Rule 5	(Storage of Organic Liquids)
Reg. 8, Rule 40	(Aeration of Contaminated Soil and Removal of Underground Storage Tanks)
Reg. 8, Rule 47	(Air Stripping and Groundwater Aeration)

C. <u>LOCATION-SPECIFIC ARARs AND TBCs</u>

A site characterization was conducted at the Jasco site to determine whether special characteristics exist at the site which warrant location specific requirements. No special characteristics were found, and therefore no location-specific requirements or "To Be Considered's" apply to the site.

OTHER LEGAL REQUIREMENTS

COMPLIANCE WITH OSHA

Occupational Safety and Health Act, 29 U.S.C. §651 et seq.

Worker safety will be governed by the OSHA requirements that are applicable to workers implementing the remedial actions at the site at the time that activity occurs. Of particular concern will be exposure to volatile organic compounds in the air, as well as direct contact with contaminated materials and hazardous chemicals used in treatment processes.

The Superfund Amendments and Reauthorization Act requires that the Secretary of Labor promulgate standards for the health and safety protection of employees engaged in hazardous waste operations pursuant to Section 6 of the Occupational Safety and Health Act of 1970.

Final regulations under this section shall take effect one year after they are promulgated. Until then, hazardous waste operations are governed by the interim regulations published in 1986 that provided no less protection for workers employed by contractors and emergency response workers than the protection contained in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH, 1985) and existing standards under the Occupational Safety and Health Act of 1970, found in subpart C of 29 CFR §1926.

The California Occupational Health and Safety Act, Labor Code Section 6300 et. seq., is also applicable to workers implementing the remedial actions at the site, particularly subchapter 5, Section 2300 et seq. (electrical safety), subchapter 7, section 3200 et seq. (general industrial safety regulations), subchapter 4, Section 1500 et seq. and 8 CCR, Chapter 4 (construction safety regulations.)

Compliance with USDOT and California EPA Hazardous Material Transportation Rules (Cal. Vehicle Code §3200 et seq.; 13 CCR §1160 et seq.)

Off-site transportation of hazardous materials will be governed by the United States Department of Transportation (USDOT) and California Department of Transportation (DOT) regulations applicable to that activity at the time it occurs. These requirements are incorporated by reference into California's RCRA regulations and California Health & Safety Code §25168.1, 25168.3, 25169, 25169.1, and 25169.3. The requirements are applicable.

A permit would be needed to generate or transport hazardous solids or liquids. The site is technically considered a "generator" because it is the source of hazardous waste or materials that may be transported off-site for disposal.

Therefore, these requirements would be applicable to that activity at the time it occurs. Generator requirements are found at 22 CCR Division 4.5, Chapter 12. Transport requirements are found at 22 CCR Division 4.5, Chapter 13.

California EPA administers RCRA and USDOT regulations. Waste transported out of the State must be handled by a licensed hauler/transporter, who will need a California EPA permit for in-state movements and Federal or State permits for out-of-state transport to secure landfills or incineration depots. The hauler/transporter must operate in compliance with State and Federal regulations in effect at the time on driver training; waste identification; container marking, labeling, and placarding; and transport manifests. Packing and shipping must be performed in accordance with 22 CCR §66262.30 - 66262.34 and 49 CFR Part 173, Subparts A and B.

8.0 DESCRIPTION OF ALTERNATIVES

OHM Remediation Services Corporation submitted a final Feasibility Study dated May 19, 1992 for the Jasco Chemical Company. The report contained the results of the subsurface investigation, a description of the groundwater and soil contamination, an evaluation of interim actions, and remedial alternatives. EPA determined that the technical information contained within the Remedial Investigation/Feasibility Study was acceptable for developing a final cleanup plan.

EPA evaluated six groundwater remedial action alternatives and five soil remedial alternatives for the Jasco Superfund site in accordance with CERCLA Section 121, the National Contingency Plan ("NCP"), and the Interim Guidance on Superfund Selection of Remedy, December 24, 1986 (Oswer Directive No. 9355.0-19).

The Feasibility Study initially screened 28 remedial action technologies for groundwater and 21 remedial action technologies for soil. These technologies were screened based on implementability, effectiveness, and cost criteria. The remedial technologies that survived the screening were assembled into a group of alternatives as follows:

GROUNDWATER ALTERNATIVES

Groundwater Remedial Alternative 1

Remedial Alternative 1 is a "no further action" alternative, retained for baseline comparison purposes in accordance with the NCP. Remedial technologies are not implemented at the Jasco site under this alternative. The existing groundwater recovery and discharge operation would cease, as would any groundwater monitoring. The total present worth cost of this alternative is negligible.

Groundwater Remedial Alternative 2: Discharge to Publicly Owned Treatment Works (POTW)

Remedial Alternative 2 consists of the following:

- Deed Restriction
- Extraction, Equalization and Mixing
- Off-Site Discharge Under POTW Permit
- Groundwater and Discharge Monitoring

This alternative would continue, on a larger scale, the current interim cleanup action at the site. Groundwater would continue to be pumped to the City of Mountain View's sewage treatment plant under a city permit or an alternate method of discharging water that complies with applicable laws. The treatment plant is capable of safely removing the contamination.

Total Present Worth Cost = $72,000 based on a 10-year remediation life and 10% discount rate. The annual discharge cost is estimated at $7,000 per year.

Groundwater Remedial Alternative 3: Ultraviolet Oxidation

Remedial Alternative 3 consists of the following:
- Deed Restriction
- Extraction
- UV Oxidation
- Polishing Treatment
- Groundwater and Discharge Monitoring
- Off-Site Discharge Under POTW Permit

This alternative would involve extracting and treating the groundwater and chemically changing the contaminants into nontoxic products. The treatment would expose the chemicals to ultraviolet light and **oxidizing** agents which cause the contaminants to form less toxic products. This is a sophisticated process that requires extra set up and maintenance time. One disadvantage, however, is that the presence of diesel/total petroleum fuel hydrocarbons in the groundwater could decrease this alternative's effectiveness.

Total Present Worth Cost = $370,000
Total capital costs are estimated at $186,000. The annual operating costs associated with the UV system is $31,000.

Groundwater Remedial Alternative 4: Carbon Adsorption

Remedial Alternative 4 consists of the following:
- Deed Restriction
- Installation of additional wells
- Extraction
- Carbon Adsorption (liquid phase)
- Groundwater and Discharge Monitoring
- Off-Site Discharge Under POTW Permit

Groundwater would be extracted and passed through a **liquid phase carbon adsorption bed**. The contaminants adhere to the activated carbon, which would then be removed from the site and disposed of at a licensed facility. The treated groundwater would then be discharged, under a city permit, to the Mountain View sewage treatment plant or an alternate method of discharging water that complies with applicable law. This system is easy to implement, requires little maintenance, and provides a cost-effective option for removing the contaminants. It would permanently remove the contaminants from the site and provide overall protection to human health and the environment. The alternative would greatly reduce contamination in the groundwater in the short term. Reduction of remaining contamination over the long-term would continue at a slower pace. Cleanup objectives would require about 10 years to achieve.

Total Present Worth Cost = $236,000
Total capital cost associated with using two carbon units annually is $38,400. The annual operating costs for the unit is estimated at $32,800.

Groundwater Remedial Alternative 5: Air Stripping

Remedial Alternative 5 consists of the following:

- Deed Restriction
- Extraction
- Air Stripping
- Groundwater and Discharge Monitoring
- Off-Site Discharge Under POTW Permit

This alternative would take advantage of the fact that organic contaminants present in the groundwater are volatile, or will evaporate easily into the air. The groundwater would be extracted and passed through an air stripper that would mix clean air with the contaminated groundwater in a tall cylinder. During mixing, the contaminants would evaporate. The air containing the contaminated vapor is then treated with activated carbon to which the contaminants adhere. The carbon filters would then be taken off-site and disposed of at a licensed facility. This process is complicated due to the low level of groundwater flow at JASCO and the requirement that a holding tank be constructed so an adequate amount of water can be stored and then sent through the system. An operator must be available to turn the system on and off. Also, the low flow rate may not provide a strong driving force for the contaminants to adhere to the carbon. These factors may act to increase the cost of the alternative.

Total Present Worth Cost = $118,000
Total capital cost associated with the installation of the air stripper is $46,000. The annual operating costs associated with operating the air stripper are estimated at $12,000.

Groundwater Remedial Alternative 6: Biological Treatment Followed by Carbon Adsorption

Remedial Alternative 6 consists of the following:

- Deed Restriction
- Extraction
- Ex-Situ Biological Treatment
- Carbon Adsorption (liquid phase)
- Groundwater and Discharge Monitoring
- Off-Site Discharge Under POTW Permit

This alternative involves extracting the groundwater and biologically treating it to destroy the majority of contaminants. Following biological treatment, the groundwater passes through a carbon adsorption system to remove any remaining contaminants. Although this alternative would immediately destroy many of the contaminants present at higher concentrations, biological treatment systems may undergo disruptions due to temperature, contaminant concentration, and other system shocks.

Total Present Worth Cost = $410,000
Total estimated capital cost is $89,400. The annual operating costs associated with the biological treatment system is $12,000 to $24,400.

SOIL ALTERNATIVES

Soil Remedial Alternative 1: No Action

As with groundwater, the No Action option is considered as a baseline for comparison of the other alternatives. No treatment would be implemented and the soil would simply be left in place. Although some degradation would occur over time, most contaminants would migrate to the groundwater. The no action alternative would not be effective in the short or long term.

Soil Remedial Alternative 2: Off-Site Treatment

Remedial Alternative 2 consists of the following:

- Deed Restriction
- Soil Excavation
- Off-Site RCRA Treatment and/or Disposal

This alternative involves excavating the contaminated soil and transporting it off-site for treatment at a facility holding a permit to treat hazardous waste in compliance with state and federal regulations, which could include incineration. As there are no incinerators in the state of California, the soil would likely have to be transported out of the state. This would be an expensive alternative. Precautions would be necessary during excavation to reduce the amount of dust released to the environment. Off-site treatment is estimated at $1,683,000, which is based on $50 per hour per truck estimate (62 truckloads taking 30 hours) to transport contaminated soil. The cost for treatment and/or disposal is $0.45 per pound of soil once the soil is delivered to the treatment facility.

Soil Remedial Alternative 3: Enhanced Biological Treatment

Remedial Alternative 3 consists of the following:

- Deed Restriction
- Soil Excavation
- Enhanced Biological Treatment within activated bed
- On-Site Replacement

Contaminated soil would be excavated and placed in an enclosed container. The soil would be mixed with nutrients to encourage digestion of contaminants by microorganisms. The container would have an air distribution system along the bottom. Air drawn through this system would provide oxygen to the microorganisms and also extract the volatile organic compounds. The air stream would then pass through an activated carbon adsorption system. The carbon would be taken off-site and disposed of at a facility with a permit to accept hazardous waste. This alternative would provide a cost-effective option for removing the contaminants and could be completed in less than 2 years. Precautions would be taken during excavation to reduce the amount of dust released to the environment. The cost for this treatment is estimated to be $150 to $225 per cubic yard of soil. Excavation costs are estimated at $200,000 and treatment costs are estimated from $165,000 to $248,000.

Soil Remedial Alternative 4: X-19 Biological Treatment

Remedial Alternative 4 consists of the following:
- Deed Restriction
- Soil Excavation
- X-19 Treatment
- On-Site Replacement

This alternative would include excavation and treatment of contaminated soil using the X-19 process (the commercial name of a biological treatment). The X-19 additive (microorganisms and nutrients) would be mixed into the soil, which would then be placed on a liner or in a treatment container. Developers of this process report that the microorganisms will consume the organic compounds to nondetectable levels within several months. Whether the treatment will destroy chlorinated hydrocarbon contaminants is not known. This treatment is a new technology that would require further study to establish its effectiveness. If proven effective, it could take less than 1 year to implement. The estimated cost of this alternative including treatability study is $278,000 to $318,500.

Soil Remedial Alternative 5: Excalibur Process

Remedial Alternative 5 consists of the following:
- Deed Restriction
- Soil Excavation
- Soil Washing (Excalibur Process)
- On-Site Replacement

This alternative involves a new technology. Contaminants would be extracted from soils using pure water and ultrasound. Ultraviolet light, ozone, and ultrasound would then be applied to the soils to destroy organic and inorganic contamination. The effectiveness of this process has not yet been established. Therefore, additional testing would be required. If proven to be effective, it is assumed that treatment would be completed within 1 year or less. The estimated cost of this alternative would be $200,000 for excavation, $50,000 for a treatability study, and $88,000 to $220,000 for treatment. The total cost associated with this alternative would be $338,000 to $470,000.

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides an explanation of the nine criteria used to select the remedy, and an analysis of the remedial action alternatives in light of those criteria, highlighting the advantages and disadvantages of each of the alternatives.

<u>Criteria</u>

The alternatives were evaluated using nine component criteria. These criteria, which are listed below, are derived from requirements contained in the National Contingency Plan (NCP) and CERCLA Sections 121(b) and 121(c).

The alternatives were evaluated in detail with respect to the nine criteria in the FS report. A detailed analysis of the alternatives was completed in the FS.

1. Overall protection of human health and the environment. This criterion addresses whether a remedy provides adequate protection of human health and the environment.

2. Compliance with applicable or relevant and appropriate requirements (ARARs). This criterion addresses whether a remedy will meet all of the ARARs or other Federal and State environmental laws.

3. Long-term effectiveness and permanence. This criterion refers to expected residual risk and residual chemical concentrations after cleanup standards have been met and the ability of a remedy to maintain reliable protection of human health and the environment over time.

4. Reduction of toxicity, mobility or volume. This criterion refers to the anticipated performance of the treatment technologies a remedy may employ.

5. Short-term effectiveness. This criterion addresses the period of time needed to achieve cleanup and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup standards are achieved.

6. Implementability. This criterion refers to the technical and administrative feasibility of a remedy.

7. Cost. This criterion includes estimated capital and operation and maintenance, usually presented in a 30 year present worth format.

8. Support Agency Acceptance. This criterion addresses California's acceptance of the selected remedy.

9. Community Acceptance. This criterion summarizes the public's response to the alternatives.

9.1 GROUNDWATER

Threshold Criteria

<u>Overall protection of human health and the environment</u>

Alternatives 2, 3, 4, 5, and 6 would be protective of human health and the environment because each involves the treatment of contaminanted groundwater. Alternative 2 involves off-site treatment of contaminated groundwater by the POTW. On-site treatment of contaminated groundwater occurs with Alternatives 3, 4, 5, and 6. Alternative 1, the "no action" alternative is not protective of human health and the environment, because it is expected that the groundwater plume would continue to migrate, further degrading the aquifer.

<u>Compliance with applicable or relevant and appropriate requirements</u>

Cleanup standards for this site are determined to be the California Maximum Contaminant Levels and federal Maximum Contaminant Levels. Alternative 1 would not comply with ARARs as the groundwater contains contaminant concentrations that exceed cleanup standards, and the potential for migration of contaminants into a potable drinking water source would remain. Alternative 2, discharge to the POTW, requires that extracted groundwater meet City of Mountain View permit levels. Permit levels have been exceeded at least four times since 1987. Alternatives 3, 4, 5, and 6 would meet this ARAR, and comply with existing discharge permit levels because each require an onsite pretreatment step prior to discharge. Spent carbon canisters will be disposed of in a manner that complies with federal and state requirements, including RCRA.

Primary Balancing Criteria

<u>Long-term effectiveness and permanence</u>

Alternative 1 would be ineffective at long-term reduction of risks posed by the contaminant plume. Alternatives 2, 3, 4, 5, and 6 would mitigate any potential future risks by preventing the migration of VOCs in groundwater, and restoring the groundwater quality of the A zone. Alternative 2 would require close monitoring to prevent the exceedance of permit levels. Over the past five years the monitoring process would detect permit exceedance only after they have occurred for at least a month. Long-term monitoring, operation and maintenance would be required. The long-term effectiveness and permanence is anticipated to be achieved in the shortest period by implementing Remedial Alternative 4.

<u>Reduction of toxicity, mobility, or volume through treatment</u>

Alternatives 2, 3, 4, 5, and 6 would reduce contaminants at the site through extraction and treatment of contaminated groundwater. Alternative 1 would not result in a reduction of toxicity, mobility or volume since it relies on natural attenuation mechanisms, such as dispersion, sorption, diffusion and degradation.

Alternative 3 would require extra set up and maintenance time. The presence of total petroleum hydrocarbons (diesel, paint thinner mixtures) could decrease this alternatives effectiveness. Alternative 4 would be permanently remove the contaminants from the site and reduce contamination in the groundwater.

To increase the rate of VOC removal additional extraction wells shall be installed. Installing additional wells will steepen the hydraulic gradient, increase groundwater velocity, shorten the groundwater flow path to the extraction point, and thereby increase the rate and efficiency of VOC extraction.

<u>Short-term effectiveness</u>

Implementation of alternatives 2, 3, 4, 5, and 6 would be protective of on-site workers and the community. Risks associated with groundwater monitoring, recovery, treatment and discharge are mitigated by the health and safety plan for the site, and by the fact that no exposures to contaminants are anticipated.

Alternative 1 will not be effective in containing the contaminant plume.

<u>Implementability</u>

Alternatives 2, 3, 4, 5, and 6 would be easy to construct and operate. Alternative 3, UV Oxidation, would probably be the most difficult to operate due to difficulties associated with obtaining optimal system performance.

Alternative 1, "no action", can be readily implemented at the site as it involves discontinuing the current remedial actions.

Cost

The cost to implement Alternative 1 would be minimal in comparison to the other remedial alternatives for the site. The existing wells would need to be plugged and abandoned.

The capital cost to implement the extraction system for Alternative 2 would be $30,000. Assuming an extraction system operating at 6 gpm for 365 days a year, the annual cost for discharge would be $5,500. In addition, the monthly analysis of groundwater would cost $1,500 annually. The system would also have to be relocated once the building is razed and industrial operations cease. The present worth of this alternative is estimated to be $72,000.

The capital cost to implement Alternative 3 would be $186,000, which includes cost of UV oxidation equipment, equalization tank, treatability study, mobilization, and groundwater extraction system. The annual operating costs associated with this alternative is $31,000. The process chemicals and utilities are based on a vendor quote of $1.20 per 1000 gallons of water. The total present worth cost for Alternative 3 is estimated to be $370,000.

The capital cost to implement Alternative 4 consists of installation of the groundwater extraction system ($30,000), and cost of two 350 gallon carbon units ($8,400). The annual operating costs are estimated to be $32,800. Assuming a 10-year remediation life and a 10 percent discount rate, the present worth of the project would be $236,000. This cost is based on operating two carbon units in series. The spent carbon is removed from the site and regenerated by the manufacturer.

The capital cost to implement Alternative 5 consists of installation of the air stripping tower with automatic control ($10,000), an equalization tank ($6,000), and the extraction system ($30,000). The total capitol cost is estimated to be $46,000. The annual operating costs associated with this remedy is $12,000. Assuming a 10-year remediation life and a 10 percent discount rate, the present worth of the project would be $118,000. The present worth of this alternative would increase $200,000 if the air effluent were treated by carbon adsorption and $180,000 if the air effluent were treated using a catalytic oxidizer.

The capital cost to implement Alternative 6 consists of installation of a biological reactor ($51,000), two liquid phase carbon units ($8,400), and the groundwater extraction system ($30,000). The total capital costs would be $89,000, and the annual operating costs would range from $12,000 to $24,400. The uncertainty associated with carbon unit replacement and carbon regeneration causes the range. Assuming a 10-year remediation life and a 10 percent discount rate, the present worth of the project would be $162,000 to $236,000.

Alternative 4 is the most cost effective remedy in that it would require the least set up and maintenance time and would still provide permanent destruction of site contaminants.

9.2 SOIL

Threshold Criteria

Overall protection of human health and the environment

Alternatives 2, 3, 4, and 5 would be protective of human health and the environment because each involves the treatment of contaminanted soil. Alternative 2 involves off-site treatment of contaminated soils by a RCRA permitted facility with treatment being incineration. On-site treatment of contaminated soil occurs with Alternatives 3, 4, and 5. Alternative 1, the "no action" alternative is not protective of human health and the environment, because it is expected that contaminants would continue to migrate from soil to the groundwater and further degrade groundwater quality.

Soil cleanup standards for this site were determined based upon contaminant migration into groundwater. The groundwater cleanup standards are determined to be the California Maximum Contaminant Levels and federal Maximum Contaminant Levels. Soil cleanup standards were then calculated to reduce the contamination to a level that no longer threatens to contaminate groundwater at levels above MCL's. Alternative 2 would comply with groundwater ARARs because contaminants would be removed from the site and destroyed by off-site treatment, thereby protecting the groundwater from contamination above MCL's. Treatability study tests have shown that Alternative 3 would most likely comply with groundwater ARARs. Organic hydrocarbons have been shown to be biodegradable and the chlorinated hydrocarbons are less biodegradable, but are very volatile. These volatile compounds would be adsorbed in the carbon beds. Treatability study tests would have to be conducted to determine whether or not the bioremediation process using the X-19 product would be successful in Alternative 4. The vendor claimed to have achieved non-detectable levels, but does not have proper treatability study tests to document these levels. Alternative 5 utilizes the concept of ultrapure water in combination with UV ozonation and ultrasound to destroy organic compound mixtures. A treatability study would need to be conducted to determine its effectiveness.

Primary Balancing Criteria

Long-term effectiveness and permanence

Alternative 2 would ensure that no residual risk would remain at the site. The off-site incineration process would provide total destruction of all chemicals of concern. Alternative 3 would permanently remove or biodegrade all chemicals of concern. Alternative 4 would permanently degrade all biodegradable chemicals, but the levels of achievable biodegradation for chlorinated compounds is uncertain. Alternative 5 would permanently destroy organic compounds during the on-site treatment operation. However, the treatability study test would have to determine whether all the chemicals of concern could be destroyed by this process.

Reduction of toxicity, mobility, or volume through treatment

Alternative 1 would not result in a reduction of toxicity, mobility or volume since the volume of material containing contaminants would increase due to diffusion and leaching. Alternatives 2, and 3 would reduce toxicity, mobility, and volume of chemicals present on site. Alternatives 4 and 5 would probably reduce the toxicity, mobility, and volume of contaminants but the extent of this reduction cannot be determined without completion of a detailed treatability study.

Short-term effectiveness

Implementation of alternatives 2, 3, 4, and 5 would be protective of on-site workers and the community. Risks associated with mobilization and treatment can be mitigated by the health and safety plan for the site. Dust suppression techniques would be employed to prevent airborne migration of contaminants. The estimated completion time for implementation of the remedies are as follows: Alternative 2 can be completed within six months, Alternative 3 within 2 years, Alternative 4 within one year, and Alternative 5 within one year.

Implementability

Alternatives 2, 3, and 4, would be easy to construct and operate. Alternative 5, Excalibur process would probably be the most difficult to operate since a fullscale system has not yet been built. A mobile treatment skid is available to treat up to five cubic feet of solids per hour.

Cost

The estimated cost to excavate soil from the drainage swale area is $200,000, which is expensive because of the close proximity of the railroad tracks. Since slumping of the soil could cause damage to the tracks soil will be removed utilizing 36" large diameter augers. The augers would be used to "drill out" the soil and boreholes would be backfilled with concrete to prevent soil slumpage.

There would be no cost for the implementation of Alternative 1. Each of the remaining alternatives include the estimated cost for soil excavation. Alternative 2 involves off-site disposal and treatment at a cost of $1,683,000. Of the alternatives involving on-site treatment, Alternative 4, X-19 treatment would cost the least to implement ($278,500 to $318,500). The estimated cost for Alternative 3, Enhanced Bio-treatment would range between $365,000 and $448,000. The cost for Alternative 5, Excalibur Treatment ranges between $338,000 and $470,000.

Alternative 2 would provide the most assurance that site contaminants could be permanently removed by the technology, but this alternative is also the most expensive. Alternatives 4 and 5 would require treatability studies to determine whether or not soil cleanup standards would be met. A combination of Alternative 3 and 2 provides the most balance between meeting cleanup standards and being the most cost effective. Soils containing residual concentrations greater than the soil cleanup standards after biological treatment has been completed would be disposed of at an appropriate facility.

9.3 ACCEPTANCE CRITERIA

SUPPORT AGENCY ACCEPTANCE

The Feasibility Study and the Proposed Plan Fact Sheet were reviewed by California Regional Water Quality Control Board (RWQCB). In a letter dated July 10, 1992, the RWQCB supported EPA's proposed cleanup plan and cleanup standards for groundwater.

COMMUNITY ACCEPTANCE

The Proposed Plan was presented to the community of Mountain View in a fact sheet and at a public meeting. No technical comments were submitted regarding the alternatives. Comments received are addressed in the Responsiveness Summary.

THE SELECTED REMEDY

Remedy Selection Rationale and Statutory Determinations

The selected remedy is protective of human health and the environment. Groundwater and soil contamination will be treated so that the remaining potential future risks fall within the 10^{-4} to 10^{-6} carcinogenic risk range for acceptable cleanup standards. The remedy will comply with ARARs by achieving cleanup to at least Federal and State MCLs.

The selected remedy will be effective in the short-term because further plume migration will be controlled by groundwater extraction and treatment along with treatment of contaminated soils. The selected remedy will be effective in the long-term by virtue of the fact that ARARs will be achieved. Groundwater extraction and treatment and soil treatment is a permanent solution and significantly reduces contaminant toxicity, mobility and volume at the Jasco site. The selected remedy is implementable.

Based on an evaluation of the alternatives, the selected groundwater remedy for the Jasco Superfund site is Alternative No. 4. Jasco has estimated that it will take approximately 10 years to achieve groundwater cleanup standards at a cost of $236,000. The selected remedy for soil contamination is a combination of Alternatives 2 and 3. Site soils shall be cleaned using the Enhanced Biological Treatment alternative. Under this treatment process, site soils located in the drainage swale area shall be excavated and placed in an enclosed treatment vessel. Soils located beneath the production facility and from the underground storage tank area shall also be excavated and placed in an enclosed treatment vessel after the building has been razed and tanks removed. The soil shall be mixed with nutrients to encourage digestion of contaminants by microorganisms. The container shall have an air distribution system along the bottom which would provide oxygen to microorganisms and also extract the volatile organic compounds. The air stream shall then pass through an activated carbon adsorption system. The carbon shall be taken off-site and disposed of at a facility with a permit to treat hazardous waste. Jasco has estimated that it will take less than two years to implement the soil treatment process at an estimated cost range of $365,000 to $448,000. If site cleanup standards are not achieved by this method, treated site soils not meeting cleanup standards shall be sent to the appropriate off-site RCRA treatment and/or disposal facility.

The selected remedy consists of the following actions:

a. On-site construction of a liquid phase carbon adsorption groundwater treatment unit. Groundwater will be extracted and passed through a liquid phase carbon adsorption bed. The contaminants would adhere to the activated carbon, which would then be removed from the site and disposed of at a licensed facility. The treated groundwater will continue to be discharged to the sanitary sewer system under existing Permit Nos. 491010 and 491520, or alternate method of discharging water that complies with applicable law.

b. Continued groundwater extraction (pump and treat) until cleanup standards are achieved in all present and future wells at the Jasco facility. Table 4.1 depicts all groundwater cleanup standards that shall be achieved.

c. Maintenance of hydraulic control (pumping of water to control the flow of the plume) to prohibit the further vertical and horizontal migration of the groundwater plume. This requirement shall remain in effect until cleanup standards are achieved.

d. Continued quarterly groundwater monitoring at all monitoring and extraction wells on the Jasco site during the cleanup period. Groundwater samples shall continue to be collected to verify that cleanup is proceeding and that there is no migration of contaminants above cleanup standard levels, beyond current boundaries or into the deeper B zone. The frequency of monitoring shall be decreased from quarterly to triannually two years after all site soils have been remediated as shown by soil confirmation sampling. The frequency of monitoring shall be decreased to biannually once groundwater cleanup standards have been achieved in all site wells and stabilized for one year.

Sampling and reporting requirements for the Jasco site are contained in the Sampling and Analysis Plan for the site which is part of the Administrative Record for the site.

e. Installation of additional extraction (pumping) wells, in a quantity and at locations to be determined by EPA, to improve the performance of the groundwater extraction and treatment system.

f. Treatment of all site soils containing chemical concentrations greater than the cleanup standards shown on Table 4.1 with the enhanced biotreatment method. Under this method contaminated soil shall be excavated and placed in an enclosed container. The soil shall be mixed with nutrients to encourage digestion of contaminants by microorganisms. The container shall have an air distribution system along the bottom. Air drawn through this system will provide oxygen to the microorganisms and also extract the volatile organic compounds. The air stream shall then pass through an activiated carbon adsorption system. The carbon will be taken off-site and disposed of at a facility with a permit to accept hazardous waste.

g. Sampling of site soils beneath the production facility, the drum storage area, and the underground storage tank area to ensure that the concentration of contaminants in these areas do not exceed soil cleanup standards. This sampling shall commence within six months after completion of treatment of soils located in the drainage swale area. If contamination exceeds the cleanup standards, the soil shall be treated as set forth in subparagraph (f) above, and if necessary, subparagraph (h) below.

h. Off-site disposal of site soils containing residual concentrations greater than the soil cleanup standards after biological treatment has been completed.

i. Restrictive easement (deed restriction). Jasco shall be required to file a restrictive easement in the Official Records of the County of Santa Clara, which prohibits use of on-site shallow groundwater for drinking water purposes and controlling other subsurface activities. The restrictive easement shall remain in place until soil and groundwater cleanup standards are achieved.

10.0 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element.

Because the remedy will result in hazardous substances remaining on-site above health-based levels, a five-year review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes to the remedy proposed in the proposed plan fact sheet.